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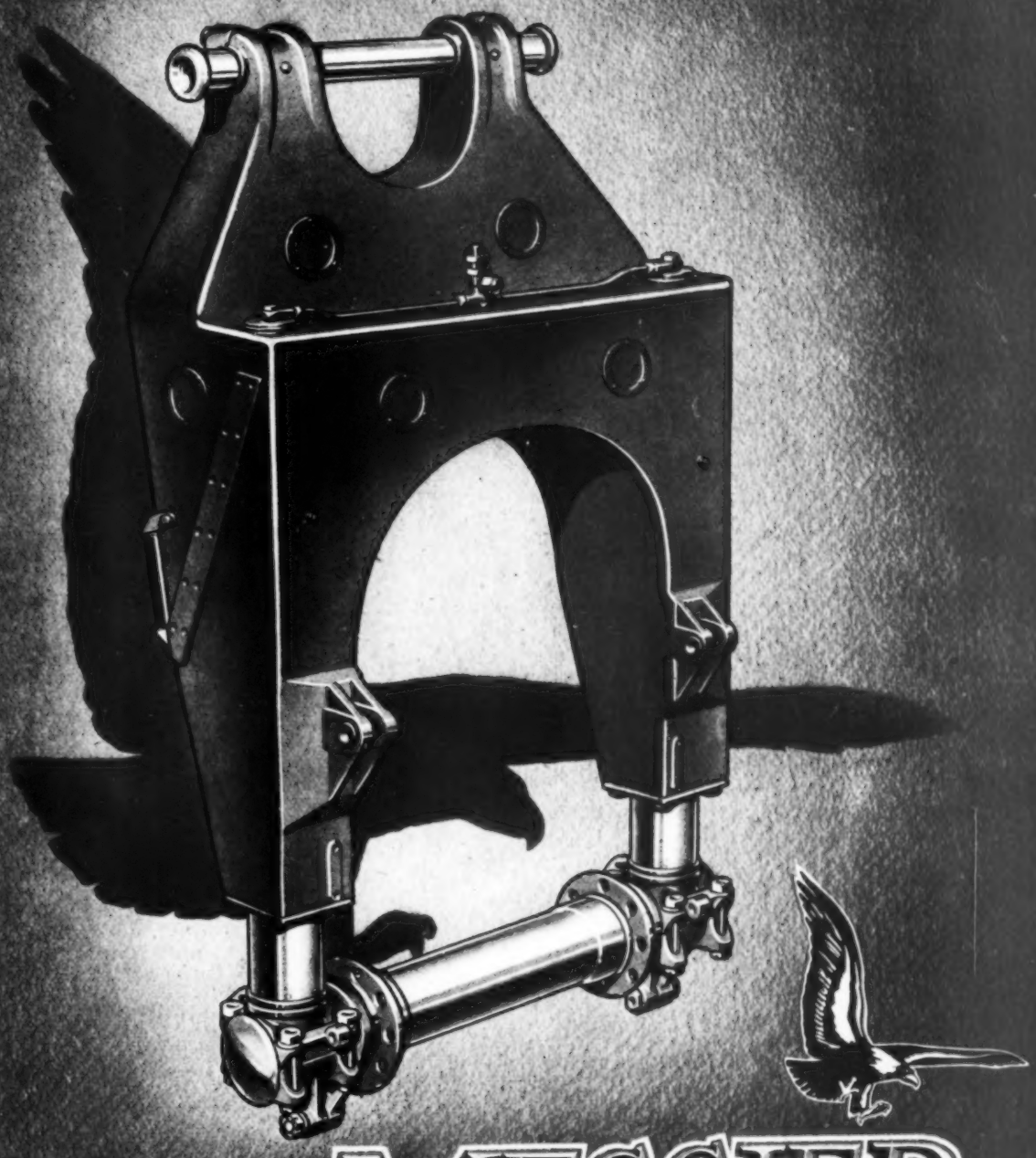
MARCH 16th, 1944



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FLIGHT and The AIRCRAFT ENGINEER

First Aeronautical Weekly in the World : Founded 1909

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The Outlook

Laying Down Principles

THE speech with which Sir Archibald Sinclair introduced the Air Estimates on Thursday last will go down to history as a classic utterance, because it gave authoritative denial to certain charges which have been brought against the Air Ministry, and also it laid down principles which should guide the thoughts of future students of air warfare.

Over and over again in the past three years have critics of the Air Ministry and the Royal Air Force charged those two bodies with holding the doctrine that the air could win the war by itself. The Air Staff itself has never put forward such a theory, but many private individuals who have claimed to be its friends have done so. The writings of the Italian General Douhet and also of the Russo-American Mr. De Seversky have no doubt been largely responsible for the spread of this idea, even among those who have not themselves read their books, but there is always a tendency for the public to imagine that a newly invented weapon will dominate all future wars.

Sir Archibald was at pains to deny this dangerous doctrine in the clearest language. He hoped that the facts which he gave to the House would dispose once and for all of "the illusion" that the R.A.F. was fighting a separate war. The triumphs of the Eighth Army have provided the model for combined work by ground troops and air power, and Sir Archibald told the House that the lessons learnt in Africa were being studied in this country. He went on to make a most important declaration, namely, that "it is not only on the squadrons of Army Co-operation Command that the Army will rely when it is fighting on the Continent of Europe. The whole resources of the Royal Air Force will be united with those of the Army. . . ."

That is a statement of tremendous importance which must guide the thoughts, doctrine and teaching of the Air Staff, the Air Staff College, and the College of Imperial Defence for the future. The highest possible authority has now laid it down that the most novel of our weapons offers no short cut to victory. In the future, as in the long past, the harmonious working together of all arms is the only sound theory of strategy and tactics.

First Things First

ANOTHER striking passage in Sir Archibald's speech laid down the various functions of the Royal Air Force in order of importance. These, he said, were, first, to protect our war industries, communications and homes from the attacks of the enemy; secondly, to take its share with the Navy in the defence of overseas routes; thirdly, to combine with the two other Services in offensive operations against the enemy's forces; and, fourthly, to attack the enemy's war industries, transport and military bases.

In the past (at any rate before the Battle of Britain) the Air Ministry unmistakably (though not in so many words) gave pride of place to Bomber Command. Sir Archibald's list shows Fighter Command as performing the primary function of air power, Coastal Command next in importance, then the whole force of the R.A.F. in third place, and Bomber Command in the fourth.

This listing is undoubtedly correct. It in no way counters the maxim that attack is the best form of defence, as a general principle, but it does make it clear that one cannot attack unless and until one has made one's base safe. The sea ranks next to our homeland, while, as stated above, combined attack by all arms is the way to win the war.

The "Hurribuster"

THERE appears to be literally no limit to the purposes for which the amazing Hurricane can be used. It started life as an interceptor fighter, with a modest gross weight of about 6,000 lb. Since those early days—six or seven years ago—its loaded weight has on occasion reached nearly twice that figure, and its functions have included fighter-bombing, sea convoy work (in which the machine is "assisted" off the ship) and long-range work with extra tanks fitted under the wings.

Armament has gradually increased from the original all-machine gun formula through a mixture of machine guns and cannon, until now it is officially disclosed that it has been scoring notable successes in the Western Desert while fitted with "heavy calibre" guns. This version of the Hurricane has been in use in North Africa for several months, and the squadron which it equips has wrought havoc among enemy vehicles.

Every multi-gun fighter of any sort will drop its nose when all guns are fired simultaneously, and in the "Hurribuster" the recoil must be particularly pronounced. Attacking as they do at a low level, the pilots are called upon to strike a balance between accurate scoring and hitting obstacles on the ground when the firing button is pressed. The fact that they have damaged so many enemy tanks and other vehicles with very small losses to themselves is proof that, once again, the Royal Air Force is equal to any demand.

The Transport Command

THE formation of a Transport Command in the R.A.F. had been expected, and will be welcomed. A nucleus already existed in the Ferry Command, which will be absorbed in the new formation. The Ferry Command has acquired much useful experience in arranging the transference of suitable stores (not counting people) from the American continent to Britain by air, and the co-operation of British Overseas Airways must have been of valuable aid.

The new Command will have to undertake much more. In addition to providing regular services it will have to arrange the conveyance of the ground equipment and personnel of squadrons to wherever the squadrons are needed overseas. Air power has been rightly described as tactically mobile but strategically very immobile, because base equipment has been so slow in transit. This brake on the wheels should now be far less.

One function of the new Command will have to be the provision of suitable types of transport aircraft, for which, to begin with, it will, presumably, have to depend in the main on American production. Before the war is over this new Command and its civil partner, British Overseas Airways, should have amassed much operational knowledge which should be of use when the day comes to embark once more on civil air transport.

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ENGLAND EXPECTS . . . : Beneath the outstretched wings of an Avro Lancaster in Trafalgar Square, Lord Kindersley inaugurated the "Wings for Victory" campaign. A total of £153,500,253 *plus* was raised.

GENERAL PURPOSE: The Martin Marauder (B26) now in service with the R.A.F. in the Mediterranean area. It is fitted to carry either bombs or torpedoes internally stowed. No details of armament or performance may be published.

WAR in the AIR

Sneak Raids on Britain : Gains and Losses in Russia : Hard Fighting in Africa

WHILE the weight of attack by Bomber Command and by the U.S. Eighth Air Force on Germany and occupied territory grows ever more massive, the Germans reply with light raids on British towns, mostly along the south coast. On the night of March 7th a big four-engined Heinkel 177 was shot down by a Beaufighter and fell into the Channel, and on the same night three Dornier 217s were also shot down. But it has become very unusual for the Germans to use large bombers in raids against Britain. They have recently sent 12 Army divisions from western Europe to aid their counter-offensive against the Russians in the Donetz Basin, and presumably they sent proportionate contingents of the *Luftwaffe* with them. There cannot be many heavy bombers left in northern France and, as a matter of fact, the raiding has been carried out almost entirely by fighters or fighter-bombers. In the latter half of February less than 50 sorties were made by them, and the average time they spent over English soil was about three minutes. Very occasionally an adventurous pilot will fly far enough inland to set the sirens wailing in London, but the general policy obviously is to kill a few British people with as little risk as possible to the raiders. The Germans do not want to lose aircraft if they can possibly avoid it, and the maximum effort at the end of last month was the crossing of the coast by eleven Fw 190s in daylight. By night fewer machines have been sent, and in the last eight days of February only one bomber made a night raid on England. These petty efforts, which produce tragedies but make no difference to the progress of the war, can be represented to the German people as heavy and destructive raids.

FIGHTING FRENCH TARGET: Sebha landing ground in the Fezzan as it appeared just before an attack by Fighting French aircraft. The hangar in the middle went up in smoke.

The contrast between these spiteful efforts and the many strong attacks by Bomber Command on such important centres as Nuremberg, Cologne and Munich needs no emphasis. Sometimes, it appears, moral effect is taken into account, as, for example, in the daylight raids on Berlin by Mosquitoes on the day when the Nazi leaders had arranged to broadcast, but there is always an intention to hit some target which contributes to Germany's war effort. Probably both considerations were taken into account in the raid on Munich on the night of March 9th. It was not such a heavy raid as many other recent ones have been, and only about 500 tons of bombs were dropped.

WAR IN THE AIR

It is hoped that useful material damage was done, but hitting Munich always hits the Nazi party in a tender spot. The headquarters of that infamous party is there, and a strong sentimental feeling attaches to the place. The flight there is one of 700 miles.

In Russia

ONE would very much like to know more about the part played by aircraft in the great battles which have been taking place in Russia. During the winter one could understand that weather would restrict flying, just as it hampered mechanised vehicles on the ground. Now the thaw must make some airfields unusable in the south. Still, every now and again there is mention of considerable air activity on some part of the front by one side or the other, and then a long silence. Of late the Russians have been talking most about the work of their artillery, both in attack and in defence. Evidently they are very proud of the new batteries which they have raised and equipped during the period when they were preparing for their offensive, and, certainly, when guns can get at a target they can deal with it much more effectually than bombers can do. But there must always be work to be done to the rear of the enemy which is out of the range of field artillery, such as hampering communications, and, when the enemy is retreating, playing the role of cavalry in the pursuit. It must be the case that aircraft have been busy both in the great Russian advance in the sector of Orel and Vyasma and also in the German counterstroke in the Donetz basin.

In North Africa, however, there is plenty of news of air activity on both sides, though there can be no doubt of the superiority held by the British and Americans. The French, too, have resuscitated the Escadrille Lafayette, or at least its name, and they are expecting supplies of machines from the United States which will permit their airmen to join in force in the gallant work which is going on.

THORNY DISPERSAL: A tropicalised Spitfire framed by the cactus hedge of a North African airfield.

The Germans have weakened their forces in the West by sending twelve divisions to Russia, and no doubt they feel that this is an opportunity which the Allies would like to seize for invading Europe. The Axis feels no doubt that its "underbelly" is in most danger, and so it is making great exertions to delay the conquest of Tunisia. Rommel accordingly lashed out, as General Montgomery put it, from the Mareth Line. The British General said frankly that he had not expected Rommel to behave in this manner. That does not mean that he was taken by surprise, but that he felt the much-advertised German had made a mistake. So he called on the Eighth Army to drive the enemy back with "a bloody nose," and the Eighth Army accordingly did so. To the correspondent of the Soviet news agency General Montgomery explained that his preparation might appear slow to many people, but that because of that his blow would be powerful and decisive.

North Africa

IN Rommel's second sally some 40 miles to the south-west of the Mareth Line the bombers, fighter-bombers and fighters of the R.A.F. played a great part in driving the enemy back. Hints have been coming out that the Eighth Army is threatening to turn the right flank of the line, and Rommel is nervous about it. One of the British objects is to force him to fight, and in these sallies he lost heavily in tanks. In the north of Tunisia Allied squadrons have been ranging far and wide and striking at hostile targets of all sorts. Of course, the *Luftwaffe* plays the same game so far as it is able to do so, but all the evidence shows that the British and American airmen are well in the ascendant. The bases in Sicily are regularly raided by the squadrons from Malta, and Naples harbour comes in for periodical visits. "See Naples and die," says the old adage; well, that is what has happened to many Germans and Italians connected with the work of sending off supplies and reinforcements to Tunisia. Many more have died while on the way across when their ships or transport aircraft have been sighted by British submarines or fighters. The same can be said about the beautiful harbour of Palermo. Mussolini did not expect these things when he stabbed France in the back

MOSSES GO NORTH: An attack by de Havilland Mosquitoes on the Knaben molybdenum mines, 40 miles east of Stavanger, in Norway. The raid was led by Wing Cdr. Peter Shand, D.F.C

ENEMY AIR LOSSES to MARCH 13th

	Over G.B.	Over Continent	Middle East
Mar. 7	5	0	1
" 8	0	6	1
" 9	3	4	0
" 10	0	1	0
" 11	8	3	0
" 12	6	7	1
" 13	4	4	0
	26	25	3

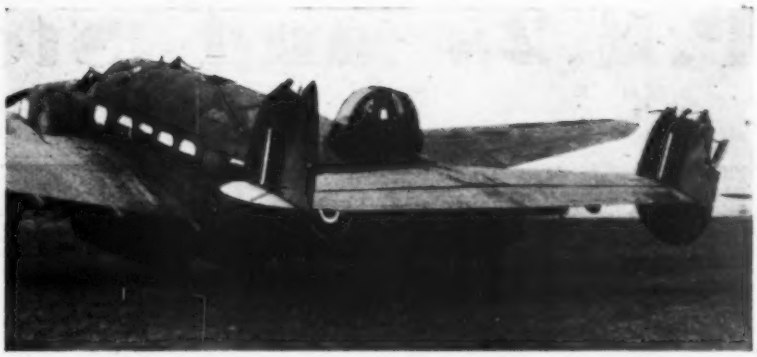
Totals: West, 6,711; Middle East, over 5,249; Tunisia, 808.

in May, 1940, or when he sent bombers and fighters to try to wreck Britain during the great air onslaught by the *Luftwaffe* later in the year. Perhaps he had been deceived by British weakness at the time of his invasion of Abyssinia, when our Bulldogs were hardly up to the standard of the best Italian fighters—but he has learnt now that it is always a risky business to twist the lion's tail. Many braggarts have had to learn that lesson—to their cost.

The German assault on Kharkov has brought news of air activity, for it has been stated that air bombardment of the Russian city, so lately delivered from the brutal German occupation, has been incessant. The inference is that, at any rate for the first days of the attack, the Russian fighters were unable to prevent the bombing and that the Germans held superiority in the air. They are clever at massing their squadrons so as to gain temporary superiority at some critical point, even when they are inferior over the whole zone of war.

Development in the West

TWO raids by Bomber Command on Essen are regarded as the heaviest blows yet struck at the German war industries. They were not made without some loss of R.A.F. heavy bombers—but it is an old maxim of warfare that you cannot make an omelet without breaking eggs. Looking at the losses from the point of view of machines, Bomber Command can afford the losses for such a profitable result. The losses in men are less than those incurred in many a minor land engagement in the African campaigns, though many of the soldiers killed or taken prisoners are less highly trained men than the air crews of Bomber Command. All losses in war mean tragedies to homes and families somewhere in the Empire, but the Air Ministry method of announcing losses day by day brings home to British people the R.A.F. losses in a specially poignant manner. The more wholesale casualty lists which the War Office and the Admiralty publish at intervals do not make quite the same impression on the man in the street. We must all turn our thoughts to the tremendous interruption of work in Krupps' armament factories, and remember that in consequence some German troops, in Russia or in Tunisia, may presently find themselves short of some weapons, and so will be unable to kill Allied soldiers on those fronts who would otherwise have had to lose their lives.



CLOSE SHAVE: A Lockheed Hudson, piloted by a Dutch sergeant, after it had collided with another aircraft while over the target.

BRITISH & U.S. AIR LOSSES to MARCH 13th

	Over G.B. A'crft.	Over Continent B'brs.	Over Continent F'trs.	Middle East A'crft.
Mar. 7	0	2	0	0
" 8	0	8	3	0
" 9	0	12	0	0
" 10	0	0	0	0
" 11	0	11	3	0
" 12	0	24	0	0
" 13	0	3	6	0
	0	60	12	0

Totals: West, 5,411; Middle East, about 2,086; Tunisia, 337.

It has been announced that for some months past the versatile Hurricane has been converted into a "tank-buster" in the African fighting. There has been talk about the possibilities of such a class of aircraft for a long time past, and it is very welcome news to hear that it has actually been in action. On the whole, it is as well that the pilots who have used it make no exaggerated claims about its effect. None the less, they seem to have put a number of enemy tanks out of action, and even a temporary stoppage of a number of enemy tanks may make all the difference to the result of a battle.

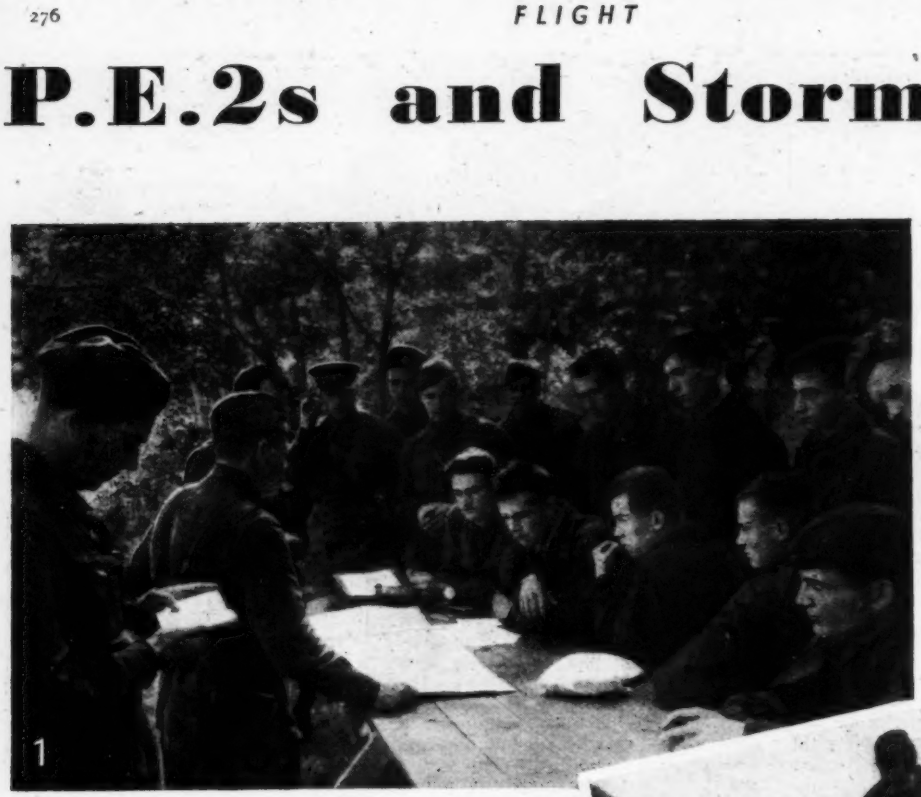
The Americans in the S.W. Pacific have spotted another Japanese convoy on the way to New Guinea, and have started to attack it from the air in their usual fashion. It was only a rather small convoy this time, five merchant ships with an escort of three destroyers. The first attack by Fortresses claimed hits on one merchant ship of 8,000 tons and another of half that size. The second attack claimed hits on another of the transports and one of the destroyers. Fighter protection for the convoy was not mentioned, and the Japanese must be running rather short of carriers by this time. Perhaps they are chary of risking their remaining carriers on escort duties for their convoys.

The raiding of enemy air bases in the islands goes steadily on, but the Japanese are still able to replace aircraft losses.

LOOKING FOR TROUBLE: With the North African mountains in the background, a N.A. B25 (Mitchell) of the U.S.A.A.F. goes on a shipping hunt over the Mediterranean.

P.E.2s and Stormoviks

Rocket Bombs on
Propaganda a
Explosives Combi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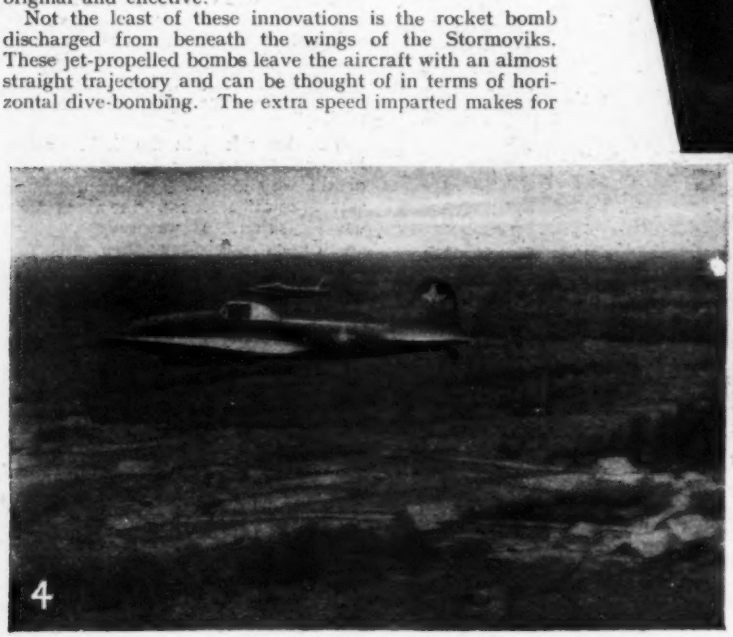
THE Russians have been extremely secretive about their aircraft, and most of the information concerning them has come from German sources. With the world against them at one time, this policy is not surprising. In many quarters their efforts were sneered at, and when, in 1937, they took the world's long-distance record it was even suggested that they stopped half-way for secret refuelling.

Actually, of course, as the Germans have found to their cost, they have turned out a lot of first-class aircraft and employed a number of weapons which have proved both original and effective.

Not the least of these innovations is the rocket bomb discharged from beneath the wings of the Stormoviks. These jet-propelled bombs leave the aircraft with an almost straight trajectory and can be thought of in terms of horizontal dive-bombing. The extra speed imparted makes for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Russian Twin-engined Dive-bomber : Tank Buster : High

3. P.E.2s in formation. The armament of the rear under-turret can be seen pointing aft.

1. Briefing close support aircrews who will attack battlefield and transport targets.
2. Bombing up a Stormovik for ordinary precision bombing. Note the propaganda leaflets tucked in the fin casings of the bombs.
4. Close support Stormovik tank busters on their way to the battle area.
5. Bombing up the centre section racks of a Stormovik. Rocket bombs when carried are on rails under the outboard sections of the wings.
6. A P.E.2 at its dispersal point. The diving brakes, which are hinged to the front spar, can be seen inboard from the Red Star identification mark.

more accurate aiming and also ensures penetration of enemy armour plate.

It has been said that these rocket bombs weigh 250 lb. each, but it is more likely that their weight is less than this, probably about 150 lb. each would be nearer the mark. As further offensive armament against ground targets the Stormovik mounts a 32 mm. cannon in each wing. About 20 shells are carried for each gun. The cockpit and the 1,300 h.p. liquid-cooled M.38 engine are protected by thick armour plate.

The twin-engined P.E.2 medium bombers are similar in some respects to the M.E.110, but a rearward firing turret is fitted beneath the fuselage. The modern twin-fin arrangement in the form of end plates on the tailplane gives both the air gunners a good field of fire. For precision bombing the bomb-aimer lies prone in the nose, but when used as a dive-bomber—the pilot does the sighting and releases the bombs. There is internal stowage for some 1,700 lb. of bombs. Top speed is said to be over 300 m.p.h. A single mast at the rear of the central cockpit carries both the wireless aerial and airspeed indicator pitot head.

HERE AND THERE

Rescued

FOURTEEN people—crew and passengers—were safely landed by pilot boat after a forced landing recently by an R.A.F. Sunderland off Leixoes, near Oporto, outside Portuguese territorial waters.

Dive-bombers for the F.A.A.

IT has been disclosed that the Barracudas, now coming into service with the Fleet Air Arm, can also be utilised for dive-bombing. American Avenger torpedo-bombers will also be used by the Fleet Air Arm.

Royal Air Force Club

THE annual general meeting of the Royal Air Force Club will take place at 6.0 p.m. on Wednesday, March 24th, at the club's premises at 128, Piccadilly, London, W.1.

More Workers for Willow Run

THIRTY THOUSAND more workers will be required by the great U.S. factory at Willow Run in order to produce the numbers of aircraft needed for the war.

Difficulty is said to have been experienced since the plant began work owing to the scarcity of suitable and convenient accommodation for employees.

"Luftwaffe" Morale Lower

ALTHOUGH Rommel now has big *Luftwaffe* formations available to support the Afrika Korps, it seems as though the pilots have not the morale they had previously. This was shown when R.A.F. fighters intercepted 20 German fighter-bombers in front of the Mareth Line. The Axis aircraft made no attempt to reach their target, but jettisoned their bombs and fled.

Enemy's Inferior Weapon

THAT the new German aircraft cannon (see pp. 285-286) is inferior to our own Hispano gun, is the opinion of Mr. Duncan Sandys, Joint Parliamentary Secretary to the Ministry of Supply.

The M.G.151 has a lower muzzle velocity and its shell is smaller and less destructive, although the design is far more complicated and must require many more man-hours in production than does the Hispano weapon.

Aircraft versus U-boats

ADMIRAL SIR PERCY NOBLE, head of the British Admiralty delegation in the United States, has given a warning about U-boats becoming even more menacing when the weather improves.

Being fully appreciative of air power, he said: "The strength of nations will depend on sea power, but sea power needs air protection." Although aircraft might beat the U-boat in time, he thinks people should realise that the danger is still great.

U.S. Air Force in China

AN indication of the increase of American aid to China is given by the following announcement from General Stilwell's headquarters at Chungking: "On the directions of the War Department, the 14th Air Force to-day came under the control of the commanding general of the United States Army Forces in China, Burma, and India. The 14th Air Force, commanded by Brigadier-General Chennault, takes the place of the China Air Task Force."

Delayed Delivery

ALEXANDRIA'S threat by Rommel compelled the diversion of the first flight of Spitfires destined for Australia. This was revealed by Dr. Evatt, Minister for External Affairs, at Sydney recently.

He said the defence of Australia did not suffer from the delay, and the arrangements originally made with Mr. Churchill have since been completed.

LANCASTER BOMBER
'O' FOR ORANGE
This Aircraft has bombed Germany 15 times including Berlin
It is of British design and manufacture throughout
and made by British men and Women.

TIMELY REMINDER: The placard below the Lancaster bomber in Trafalgar Square stresses the fact that it is the product of British brains and British workmanship—and there is no better guarantee of quality.

Kaiser Buys Fleetwing

A NEW venture has been undertaken by Mr. Henry Kaiser, America's four-day shipbuilder, in acquiring Fleetwing Aircraft, Inc., of Bristol, Pennsylvania, a concern of 5,000 employees supplying aircraft to the army.

Included in the Fleetwing property is an old shipyard which could be utilised for the mass production of flying boats.

Cautionary Couplets

THE catering officer of a Fighter Command station in the North-East of England concocts rhyming slogans in aid of National Savings, salvage efforts, and the crusade against careless talk, examples of which appear in the station's Daily routine Orders.

Here are a couple of neat samples:—

"Pence make pounds and pounds make guns,
So lend your pence to pound the huns."

"Silence is golden—be a millionaire,
When you talk in public always take care."

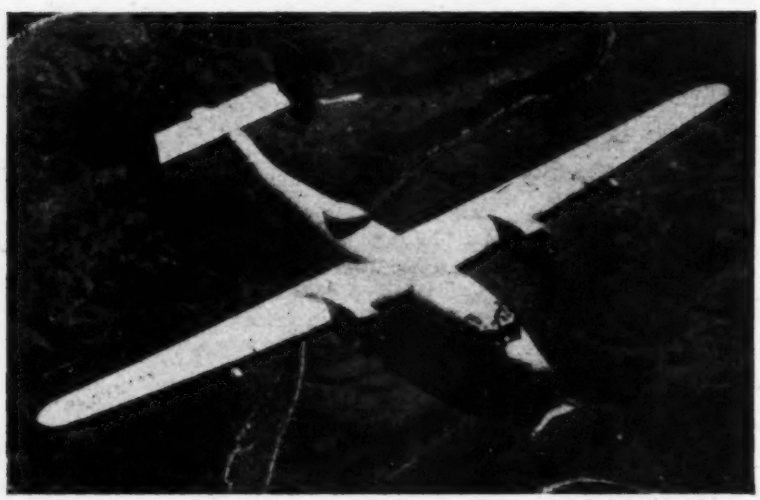
H. and C. Laid On

IN Iceland there are hot-water open-air baths for the aircrews, and hot-air blowers for the aircraft.

Newly arrived officers and men of Coastal Command shudder when invited to take an open-air bath, but when at last persuaded to take the plunge they find the outdoor swimming pool near Reykjavik is filled with hot geyser water. Not the five inches of geyser water you have in the bath at home, but hot water from a natural spring—there are lots of them on the island.

Some of the springs erupt almost at boiling point, but the water in the swimming pools and showers is controlled at a lower temperature.

The purpose of the hot-air blowers is to melt the ice that in winter forms on the aircraft during the night. The blowers are kept at work while the engines are revving up; otherwise ice would re-form, and the aircraft would be unable to take off.



ANOTHER "FASTEST EVER": The Consolidated 31, known to the U.S. Navy as the P4Y-1, is reported to be hailed by them as the speediest flying boat in existence. It is powered by two 2,000 h.p. Wright 18-cylinder Duplex Cyclones, has a span of 110ft., a length of 74ft., stands more than 20ft. high and weighs about 25 tons. It is now to be mass-produced at a plant in New Orleans.

German Engine Projects

A Multi-bank Junkers Radial and a Twin Daimler-Benz Installation

INDICATIVE of the trend of progress in various countries toward aircraft engines of greater capacity and power by increasing the number of cylinders rather than their individual dimensions, are two German designs, the subject of the acompanying illustrations. The examples emanate from the Junkers Co. and Daimler-Benz. In the first case the Junkers Company have devised a four-row twenty-four-cylinder radial engine, but there is as yet no evidence that it is in service. The object of the designer was to create a four-stroke multi-bank radial with four rows of six cylinders each, which had the simplest possible form of crankshaft and in which forces exerted on the crankshaft would be reduced to a minimum. For this purpose each two of the radials were formed into a group, the two groups working in the following manner: Double firing in the direction of crankshaft rotation of two opposite cylinders of two radials of one group, followed by the firing in the direction of rotation of two cylinder pairs of the other group.

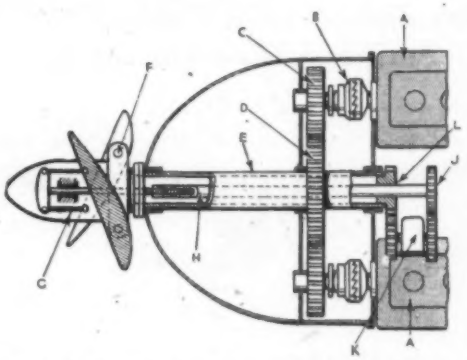
Advantages of this scheme are that a crankshaft has been devised with cranks in one plane, and thus of a shape similar to those of a four cylinder in-line engine, and that loads on the crankshaft bearings are minimised by the simultaneous firing of opposite cylinders of one group.

A Twin DB Engine Installation

The recent confirmation by the Air Ministry of the report that the He 177 four-engined bomber has in each circular nacelle "two Daimler-Benz 601 engines mounted side-by-side and driving a single propeller through an extension shaft"—designated DB 606—gives particular interest to the sketch of such an arrangement which was published some time ago by the Daimler-Benz Company.

Specifically, it referred to the method of driving a single variable-pitch airscrew from two or more engines. Incidentally the drawing shows a pusher-type airscrew. The drive from the two engines, A, is through over-running clutches, B, and reduction gear pinions, C, which mesh with a gear, D, on the tubular airscrew shaft, E. The airscrew is of the two-bladed type with the blades adjustable about offset pivots, F, to vary the pitch. Such adjustment is effected by means of links, G, connected to a crosshead on the end of an axially movable stem which is screw-threaded into the end of the co-axial pitch control shaft, H. Secured to the end of the control shaft is a pinion, J, meshing with the output wheel of a governing device, K, which is driven by a pinion, L, secured to the hollow airscrew shaft.

It will be noted that the arrangement is characterised by the drive of both the airscrew and its pitch adjustment mechanism being derived from the common airscrew shaft. Thus, if one engine should fail from any cause, the airscrew will continue to be driven by the remaining engine or engines.



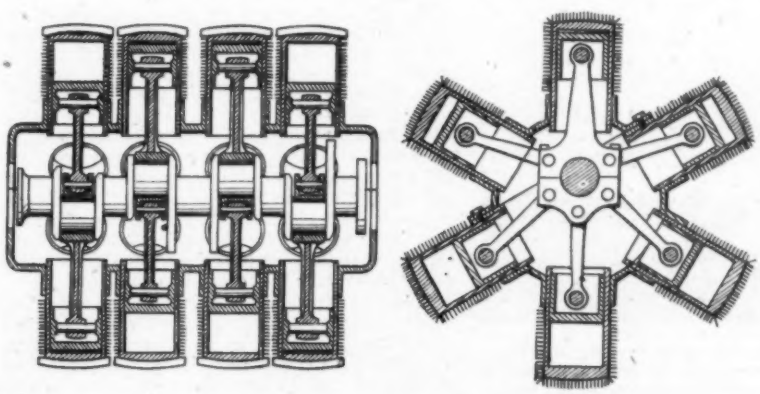
The Daimler-Benz method of coupling two or more engines to a common airscrew.

In normal operation the control shaft is driven without interference by the governing device and runs at the same speed as the airscrew shaft. When, however, the speed of the airscrew shaft rises above or falls below a specific r.p.m. the governing device, which may be of any suitable mechanical, hydraulic, pneumatic or electrical type, operates so that it displaces the control shaft through an angle in relation to the airscrew shaft. This displacement is transmitted by means of the screw thread engagement of the crosshead shaft with the control shaft to produce an axial movement, and the airscrew blades are turned about their pivots to alter the pitch.

It is important to note that the scheme is applicable to variable pitch, counter-rotating airscrews or, if desired, for several airscrews taking their drive from the common shaft driven by two or more engines.

He Not Me!

In connection with the DB 606 engine installed on the He 177 bomber, it was stated by the Air Ministry last week that a report that the same engine is fitted to the Me 115 fighter is inaccurate "as no aircraft of that designation exists." In itself that definite assertion confirms a universally held belief. Evidently the Air Ministry is not aware that the original report emanated from a technical branch of the Ministry of Aircraft Production, which has on two occasions quoted foreign reports of the existence of the Me 115 on the Russian front, and that it has a DB 606 twenty-four-cylinder X-type engine of 2,200 h.p. Possibly Me is in this case a misprint for He. If this is the explanation the Air Ministry would have assisted by stating so. Obviously, the position as to the engine and the aircraft has not been clarified, although the drawing and foregoing notes on the Daimler-Benz development of a double engine operating a single airscrew throws new light on the subject, and reveals an interesting technical departure. G. S.



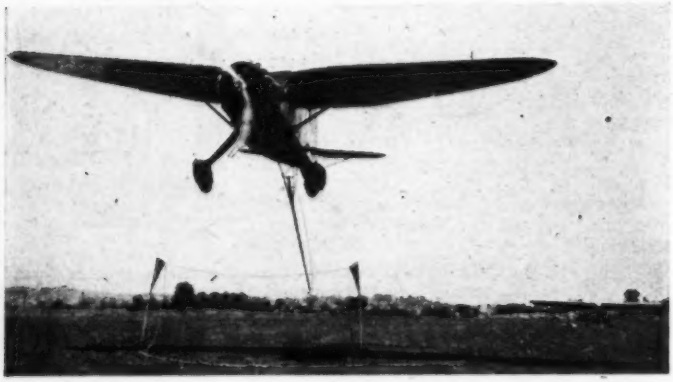
The Junkers 24-cylinder four-row radial engine.

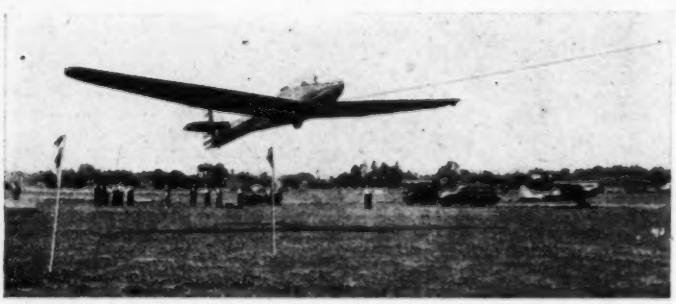
Glider Pick-up

Adaptation of an Air Mail System for Short-distance Service : Flexibility and Speed a Public Need in Future Airline Operation

HAS the transport glider any future in the world of post-war air services? At least one experienced airline operator in America thinks that it has, and that its most important commercial use will lie in the development of the pick-up system for short distances.

This system has already operated on a scheduled air mail and express service by All American Aviation Incorporated, who have successfully applied it to light gliders experimentally. Its ultimate development whereby a large transport glider, similar perhaps to the present troop-carrying type, may be picked up by a large multi-engined airliner while flying at little if any less than its normal cruising speed, would not appear to present any insuperable difficulties—though difficulties of one sort and another there are almost bound to be.





HOW IT IS DONE : Three stages in the experiments in glider pick-up. (Top) The Stinson Reliant tug is just about to engage its hook in the loop of the Nylon tow-line ; the glider can be seen about 200ft. in the rear. (Centre) The tow-line is hooked from the pick-up posts. (Bottom) Operation successfully completed ; note the short take-off run.

In a recent issue of our transatlantic contemporary, *American Aviation*, Mr. Richard C. du Pont, head of All American Aviation, Inc., sets forth a number of arguments in favour of the development, on these lines, of his company's air mail pick-up system, which, incidentally, is the only one of its kind in the world at present.

It has to be conceded that commercial aviation has received more attention and, therefore, made more progress in America than in any other country in the world ; that they should have left Great Britain so far behind, between 1918 and 1939, in the development of air transport was not due to any lack of technical knowledge or engineering skill in this country, but to other lamentable reasons which have been discussed in *Flight* on many occasions. This aspect of the subject, however, does not concern us at the moment, though we may express the hope that visibility in our official skies has sufficiently increased by now to avoid, after this war, the myopic muddlings of the past. Meanwhile it is not a bad idea to take note of trends and development elsewhere.

Dreams That Came True

That commercial aviation has not been without its retarding influences, even in progressive America, is indicated by Mr. du Pont's comment that "Never again must we permit an over-conservative influence to retard developments in aviation as it has done. Many things which are commonplace in aviation today were once regarded as the dreams of visionaries."

Mr. du Pont points out that experience in pick-up operations to date has shown that they can be made at ground speeds as high as 160 m.p.h., and with loads appreciably greater than those daily collected on the air mail and express service.

"There appears to be no immediate limit," he says, "to the speed at which pick-ups can be made, nor does there appear to be any immediate limit to the size of tug and gliders used for such operations. Furthermore, glider pick-up experiments already have demonstrated that little or no more delay is required for a glider pick-up than for a mail pick-up."

The photographs illustrate very clearly the various stages of the pick-up system as applied to gliders and were, in fact, taken at Wright Field during the successful experiments already mentioned. At the controls of the glider during the first non-stop pick-up was Col. F. R. Dent, U.S. Army Air Corps, and head of the experi-

mental glider unit stationed at Wright Field. It should be explained that, inside the tug, there is a reel equipped with a braking device. On this is wound the requisite length of cable so that, when the pick-up is made, it can be allowed to run out while the brake is progressively applied, thus taking up the load and accelerating the glider smoothly. The tow-line from the glider to the pick-up posts—about 200ft. of it—is made of Nylon which gives additional resilience, with strength, and helps to damp out any snatch.

How Pick-up is Effected

The glider used in the Wright Field demonstration was an XTG-3, and the pick-up tug was a Stinson Reliant. Pick-ups were made at speeds from 95 m.p.h. to 125 m.p.h. without any noticeable shock or strain on either glider or tug. At the moment of engagement between hook and tow-line, the cable reel was allowed to spin freely; the brake was then gradually applied and the glider was airborne in a few yards and well before the reel was fully braked.

The immediate practical purpose behind this glider pick-up demonstration was connected with the training of glider pilots, the idea being that it would, if adopted by the U.S. Army Air Force, greatly speed up the programme of training by eliminating the need for tugs to land and take-off every time a pupil made a flight; one tug could get a number of gliders into the air in fairly quick succession.

Returning to the possibility of developing this pick-up system for heavy transport gliders, it is already reported that its application to U.S. Army Air Force transport gliders is being contemplated, and it would be but a comparatively short step from that stage to its eventual use for peacetime commercial air freight.

Now let us examine Mr. du Pont's review of the transport situation as a whole with special reference to the niche the pick-up glider might very usefully fill.

The evolution of the domestic transport system, he points out, has been towards bigger and faster aircraft which can make fewer and fewer stops; the larger aircraft become, the less flexibility they offer for scheduled flying because they demand larger airports, better surfaced runways and so forth. Patently, if the utmost flexibility is not provided, aviation cannot provide a complete public service. Although the airline map of America looks impressive it actually covers only 355 cities and of these only 240 were designated stops on trunk lines, the remaining 115 being communities served by the existing pick-up mail system. Even before the war brought about its own limitations on civil air services, a number of the 240 designated stops had been suspended, either because their geographical proximity to other points on the same route made it impracticable to serve them, or because their airports were inadequate for large modern aircraft. Here was a case where the pick-up glider could at least have maintained freight transport service.

Providing Flexibility

"It is in meeting this public demand for flexibility," says Mr. du Pont, "that it would appear that the glider when combined with the extreme flexibility of the air pick-up system can render its greatest service and can demonstrate the kind of efficiency and flexibility that has heretofore never been dreamed of in any kind of transportation."

The possibilities do not stop at transporting goods by this method but, in Mr. du Pont's opinion, could be equally well extended to passenger services. The pick-up glider transport, in fact, could provide express and local service combined in one in such a way that cargo and passengers could be carried over a route on which service is rendered at numerous intermediate points, but where at the same time each passenger and shipment will receive, in effect, through service.

The maximum load-carrying capacity of a formation (without the pick-up feature) could not be utilised over the entire route, and the problem of retrieving the gliders and returning them to terminals would remain. With the application of the air pick-up principle, however, cargo glider operation begins to assume more practical aspects. The pick-up gives the combination of speed and flexibility which are the primary requirements of what Mr. du Pont calls "short haul" transportation.

Dealing with the speed factor, he points out that it has already been found that on the present air-mail pick-up routes the scheduled speed is 89 per cent. of the cruising speed of the aircraft. Applying this ratio to the cruising speed of a Douglas DC-3 with gliders attached, which has been estimated as 135 m.p.h., it would be possible to maintain a scheduled speed of 120 m.p.h. over a hypothetical route in a straight pick-up operation. This would be at least 15 m.p.h. faster than the glider-tow operation previously described, and still two miles per hour faster than the average schedule speed now maintained by DC-3 airliners over a route of this sort.

On glider pick-up routes, where there is more than one intermediate stop, it will be necessary, of course, to operate glider formations composed of one for each intermediate point. The hypothetical route would require a tug and three gliders. At each *en route* point a glider would be delivered and another picked up, which would give these places service both to and from terminals—something that would not otherwise be possible unless landings were made. Use of more than one glider should not materially affect the scheduled speed of the operation; the frequency of pick-ups causes little or no delay.

Experience already gained in pick-up operations has shown that they can be made at speeds substantially above the cruising speed of the aircraft: in fact, test pick-ups have already been made at ground speeds as high as 160 m.p.h., and it has also been demonstrated that little or no more delay is required for a glider pick-up than for a mail pick-up.

An Outstanding Feature

One of the outstanding features of the glider for military purposes, and one of the outstanding factors in operating motorless craft, is the fact that it can be landed in areas many times smaller than is needed for a power-driven aircraft of similar capacity. Through the medium of the pick-up system it can now be retrieved by air from similarly small areas, which would ordinarily make it necessary to dismantle the glider. This advantage means that the size of local airports would not restrict the scope of a glider pick-up service in scheduled operations as it now does in trunk line operations.

Mr. du Pont believes that the design of more efficient tug and glider combinations, plus more experience in the operation of glider formations or trains, will eventually make it possible to tow a relatively large number of gliders by a single tug. This would obviously greatly increase the flexibility of the pick-up system and permit much greater intensification of this type of service.

"There are those who believe," said Mr. du Pont, "that glider operations will never be practical commercially because of problems concerned with take-off, rough weather, blind-flying, and similar difficulties.

"This theory reflects the philosophy which for years has been retarding the development of aviation, and I must express complete disagreement with it."

He added that many of these problems had already been practically eliminated, and it was safe to predict that if a progressively constructive attitude were taken towards their solution, all these problems would quickly be solved. We were entering a new field of aviation which remained to be fully explored.

A.T.A. BENEVOLENT FUND

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W.L. and A.D.R.	1	1	0
	£5,934	18	10

Stowing Air Freight

American Company Introduces New Light-weight Equipment : Cargo Held Safely in Place : Loading and Unloading Speeded Up

WITH the extensive use of air transport the question of stowing and securing cargo quickly and safely assumes increased importance. The variety of shapes of the items to be carried by air is such that it is scarcely conceivable that any single device could serve all purposes. What has made the stowage problem even more difficult is the almost universal use of aircraft having fuselages of circular or oval section into which square boxes cannot readily be fitted snugly so as to be secure against movement in all directions.

An American firm, the Evans Products Company, has recently introduced new equipment of low weight, specially designed for use in aircraft, although doubtless it might find applications in other forms of transport. The equipment can be adapted for use in any type and size of aircraft, and it is claimed that not only does it hold down securely any sort of cargo, but that it saves considerable time in loading and unloading, an advantage which, in these days of need for quick turn-round, is not to be despised.

Beams and Jacks

One form of Evans air cargo hold-down equipment incorporates the use of hook-rods, locking device, twin wood beams and jack. The rods are hooked into eyebolts in the floor of the fuselage at each side of the cargo, and the wood beam is slipped over the rods and locked securely in place. In this case the hook-rods act as transverse bars and prevent any vertical movement of the freight. The action of the jack is such that it exerts any desired pressure on top of the load and locks each wood beam or cross-member.

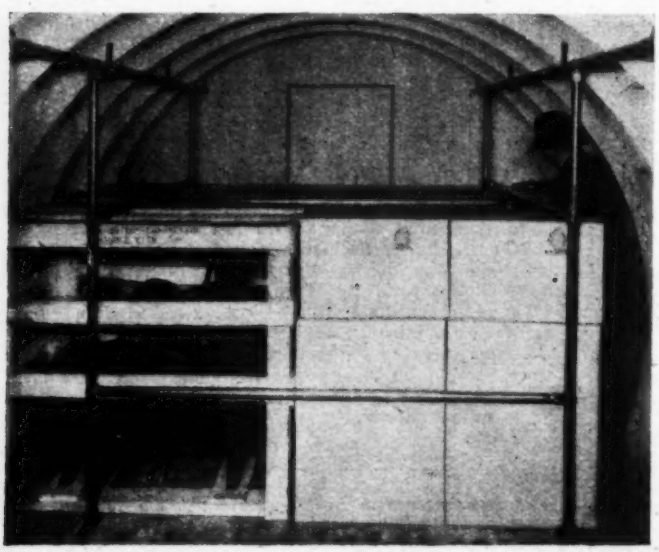
This system does not require the use of rope and permits speedy loading and unloading of cargo. In actual loads already transported over thousands of miles, this hold-down equipment has held the cargo safely in place without movement of any kind in transit. This type of equipment is particularly suitable for holding down heavy cargo, such as drums, barrels, boxes, cartons and other bulky and heavy shipments.

Details of the tubular hold-down system shown in the picture in the lower left-hand corner. The tubes are sprung down on the cargo and locked in position by dowels in the jaws of the fork ends.

Another system is the Evans rope-hook and tightener equipment. This may be used separately or in conjunction with the wood-beam hold-down equipment. This method of securing a load simplifies rope tying, totally eliminates rope cutting and saves loading and unloading time. Specially designed hooks, which hold the rope, are attached to eyebolts in the floor or walls of the aircraft. A special tightener is employed to take up all rope slack at time of loading. Further tightening can be made in transit if the rope should stretch due to changes in humidity or through other causes. This equipment is claimed to be so simple in application that even inexperienced loaders can use it with maximum effectiveness.

In addition to the types of air cargo hold-down equipment described above, Evans engineers have also completed a tubular type of hold-down equipment designed for permanent installation as an integral part of air cargo machines.

This equipment consists of perforated tubing.



How cargo is secured by the permanent type of tubular equipment, which forms an adjustable framework inside the aircraft structure. The uprights are attached to floor and roof or bulkheads.

These two accessories are used in conjunction with ropes. That on the left tightens the rope and the hook secures the end to the floor.

STOWING AIR FREIGHT

There are four tubes installed longitudinally, one on each side above (attached to ribs in the roof of the cargo compartment) and two installed in the floor (attached to floor posts). To these longitudinal tubes are fastened adjustable vertical members, to which can be fastened tubular cross-members. The cross-members can be pressed downward on the cargo, exerting sufficient pressure to prevent any movement of the load they are designed to hold.

Vertical members and cross-members are removable, interchangeable, and so designed that they can be adjusted at half-inch intervals. Being telescopic in design, these removable members also can be adjusted in lengths from a minimum of 4ft. 6in. to 6ft., or any lengths suitable for the particular aircraft.

These tubular members are so constructed as to lock safely at any desired position and thus hold the load securely. The attachment is made by means of a jaw at each end of the removable member. These jaws are provided with three dowel pins on each half of the jaw which enter into perforations and clamp tightly shut on the tube. The weight of these members is 7 lb. each. Weight of the permanent roof and floor longitudinal members, with attachments, is 1 lb. per foot.

Cross-members can be so placed that they form either hold-down units, bulkheads, or both. The number of members that are used in a load is entirely dependent on the type of load, using only as many members as are necessary in order to hold the load safely and securely in place at any angle of tilt under all kinds of flying conditions.

Simplicity has been the keynote in the design of this equipment. This permits its immediate application to air cargo machines now in the process of development, without need for making any design changes.

Securing cargo by means of ropes and the hooks and tighteners shown in the bottom right-hand corner of the previous page.

Lockheed AT-18

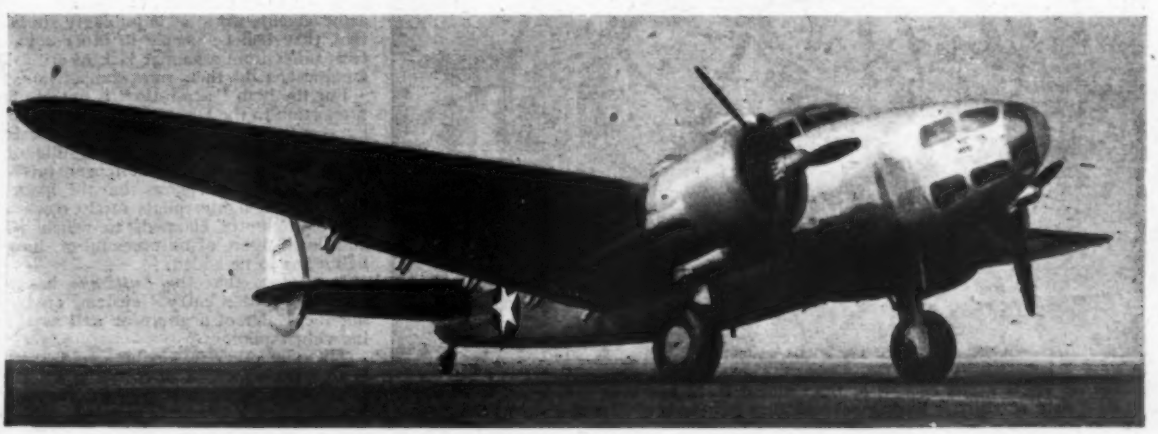
Hudson Bombers Converted into Trainers

TWO trainer versions of the Hudson bomber were in production at the California plant of the Lockheed Aircraft Corp. at the beginning of the year, one for use as a gunnery trainer and the other as a navigation trainer.

As converted into trainers from the Hudson III model, the plane is designated AT-18, and is intended to be used only in the United States for training advanced gunnery pupils and in a course of aerial navigation. Most internal equipment of the bomber is omitted.

In the gunnery version a Martin turret takes the place of the Boulton-Paul turret mounted on bombers used by the R.A.F., and is equipped with two 0.50-calibre machine guns which pupils fire at wind socks trailed behind another AT-18 trainer. The cabin is fitted with seats, regulation U.S. Army Air Forces radio, inter-com. equipment for pilot, instructor and one pupil, a low-pressure oxygen system and a windlass system for letting out and retracting the target sock through the turret-gun opening.

For navigational training the standard Hudson instruments are duplicated on a second panel in view of pupils seated in swivel seats at desks, above each of which is an astrograph, or map of the heavens. Pupils are taught sextant observation in a dome in the cabin roof. Included among instruments on or near the panel in the cabin are an airspeed indicator, an altimeter, a directional gyro., a compass, a clock and a thermometer for indicating atmospheric temperature.



The Lockheed AT-18—trainer version of the Hudson.

Behind the Lines

Service and Industrial News from the Inside of Axis and Enemy-occupied Countries

From Japan

A NATIONAL association of Japanese aeronautical engineers is reported to have been formed in Tokyo. Under the name of *Dai Nippon Koku Gijitsu Kyokai*, the new organisation is to function as the representative body of the professional interests of aeronautical engineers and is to further the development of aeronautical science in Japan.

Prof. Dr. Koroku Wada, who was recently appointed corresponding member of the German Lilienthal Society, has been elected president.

Education

A NEW plan for fostering the studies of *Luftwaffe* members has been adopted by the German High Command. The "*Akademisches Berufsfoerderungswerk*" (Plan for Promotion of Academic Professional Training) aims at establishing a closer connection between universities and students on active service, and is designed to help them to complete their studies. A specially intensive organisation is planned for holders of matriculation certificates serving with the *Luftwaffe*. For their benefit correspondence courses, through which university professors will prepare students for examinations, are to be organised by the Air Ministry in co-operation with the Ministry of Education and Science. Short periods of leave for studying *Luftwaffe* members will be granted to enable them from time to time to meet their tutors and to attend oral examinations. It is understood that this scheme has been adopted with special regard to the shortage of academically trained experts in the German Air Force.

Honoured

ON Kurt Tank, the designer of the Focke-Wulf FW 190, has been conferred the title of Professor by a special decree of the Fuehrer. Kurt Tank was born on February 24th, 1898, at Bromberg, and served in the war 1914-18 with the German Air Force. After the armistice he turned to engineering and subsequently became the chief designer of Rohrbach Metallflugzeuge. From that firm he went over to the Bayerische Flugzeugwerke in a similar capacity, and in 1933 became the technical director of the Focke-Wulf works at Bremen. Since then he has made his name by designing the Fw 187, Fw 189 and the Fw 200.

Rumanian Effort—

THE heavy losses suffered by the Rumanian Air Force on the Russian front, and German pressure for more men, are responsible for the feverish efforts to increase the man-power potential of that air force.

The Under-Secretary for Air and the Ministry of Education are jointly organising a wide drive to intensify the air training of Rumanian youth. In conjunction with this activity a gliding school is reported to have been opened on March 4th near Bucharest.

—and Bulgarian

THE vice-president of the German Gliding Club, Krogmann, and the S.A. Oberfuehrer Kontz, paid a visit recently to the C.-in.-C. of the Bulgarian Air Force in Sofia, where they inspected establishments for pre-military air training. These are mainly confined to gliding, and entrusted to the State Youth Organisation, the "Brannik." Gliding courses under German instructors have been in existence for the past six months.

The German Gliding Club recently sent a complete workshop for glider construction to Bulgaria, and there can be little doubt that the Germans expect some "dividends" out of this collaboration.

Quisling Air Unit

TO win the Norwegian youth to a more active co-operation, the Germans, and Norway's Quisling, are now reported to have organised an air formation to be known as the "Hird" Air Corps. Capt. E. W. Eliassen has been appointed commandant of the formation, which the Nazis probably regard as a channel for recruiting for the *Luftwaffe*. Capt. Eliassen has hitherto been in charge of the "Luftfartstyret," the air organisation of the Quisling Government, and succeeded Col. Mjölner, who was relieved of his post because of his affiliation to a Masonic Lodge.

Charmed Lives

PRACTICALLY each issue of the German Press brings the news of yet another *Luftwaffe* pilot credited with about a hundred or more shot-down aircraft. These reports are not limited to a few selected names, but the list of these "aces" is constantly growing.

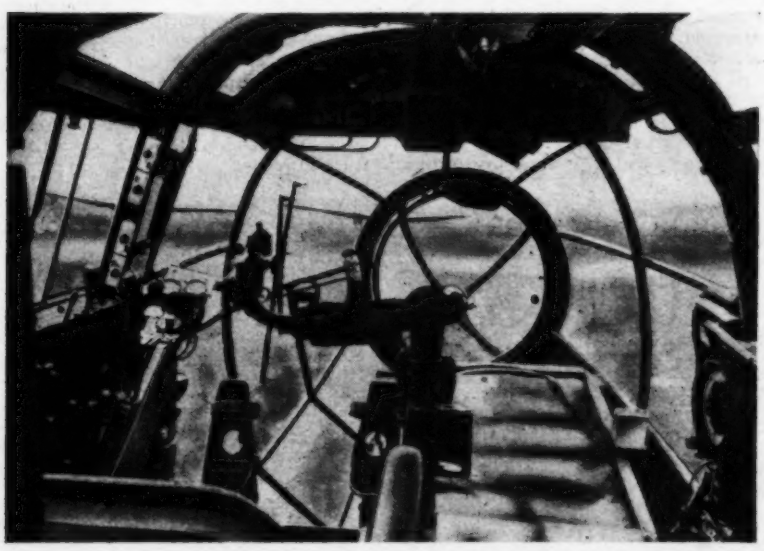
A recent example is provided by a widely circulated statement about twenty-eight fighter pilots who between them are credited with the destruction of 3,239 Allied aircraft. With the customary thoroughness, a German official publication promptly applied its expert to work out the loss in material and man-power hours sustained by the Allies by this wonderful feat of Nazi aces. The result is, of course, staggering: 4,860 tons of aluminium and 583 working days of 50,000 workers!!

In view of their notorious gullibility, it is not unreasonable to credit the Germans with that high degree of naivety which allows them to believe in such claims. But the fact that the German propaganda attempts to give these achievements world-wide publicity shows that they believe people in other countries suffer from a similar lack of critical faculties as do their own compatriots.

For the high "ace ratio" is out of all proportion to the average losses sustained by the *Luftwaffe* in air combats, nor is it in any proportion to the results of battles with the R.A.F. Moreover, international experience shows that the operational life of fighter pilots rarely reaches the high figures claimed, to which an additional figure of unsuccessful or draw fights has to be added.

It appears that the *Luftwaffe* has a sort of "double entry" system, crediting the leader of a group as well as the individual pilot.

The only other reasonable explanation is that their method of crediting a pilot is far less rigid than that of the R.A.F., and that keeping one eye on propaganda, the Germans deliberately accept such inflated credits of their pilots.



INSIDE VIEW: The cockpit of the Heinkel He 111 has been redesigned to give a better field of vision. Early types had thick structural girders obstructing the view and cumbersome instrument arrangement, now replaced by an overhead panel. The He 111 is widely used by the *Luftwaffe* on the Russian front.

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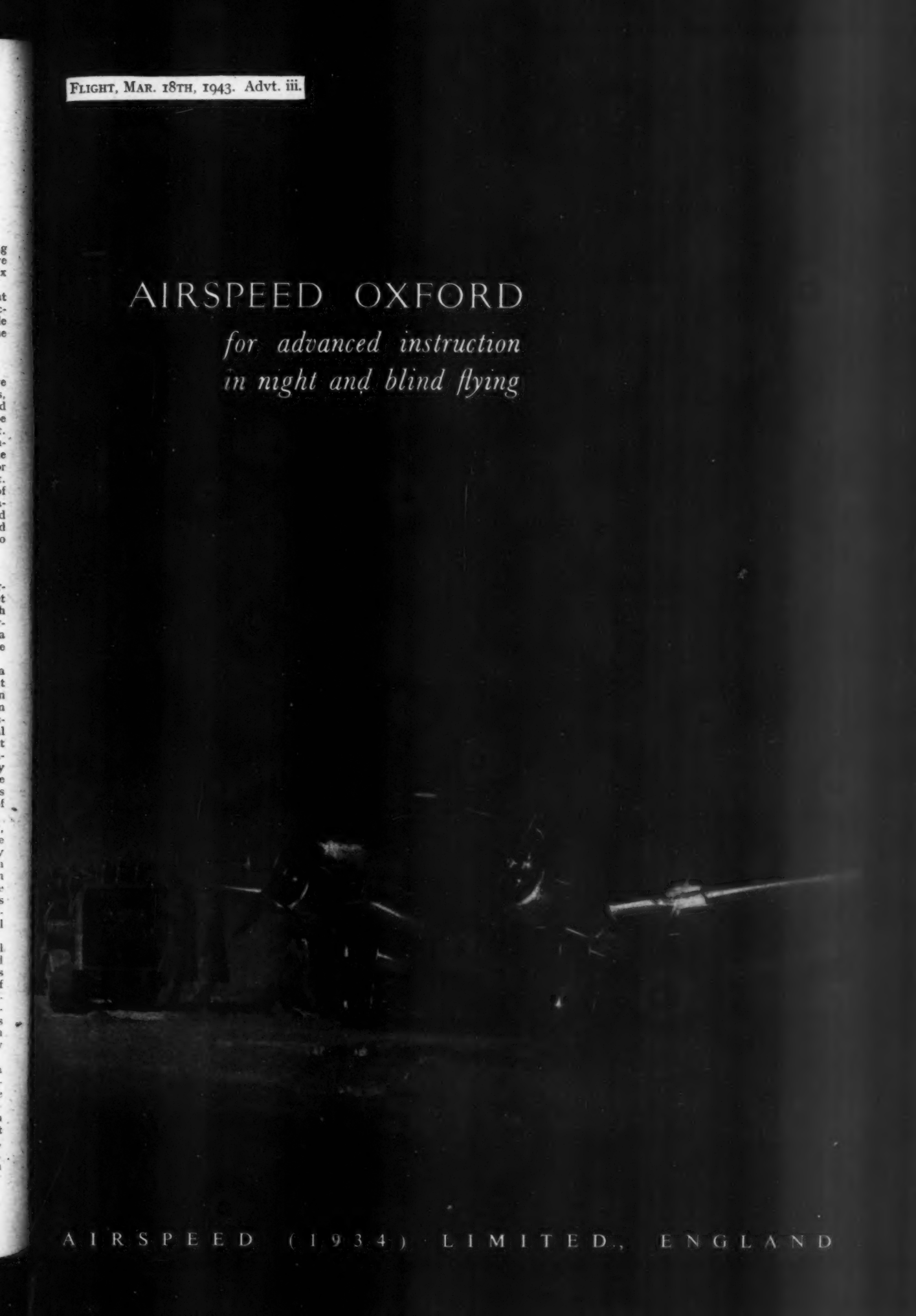

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VOUGHT-SIKORSKY CORSAIR

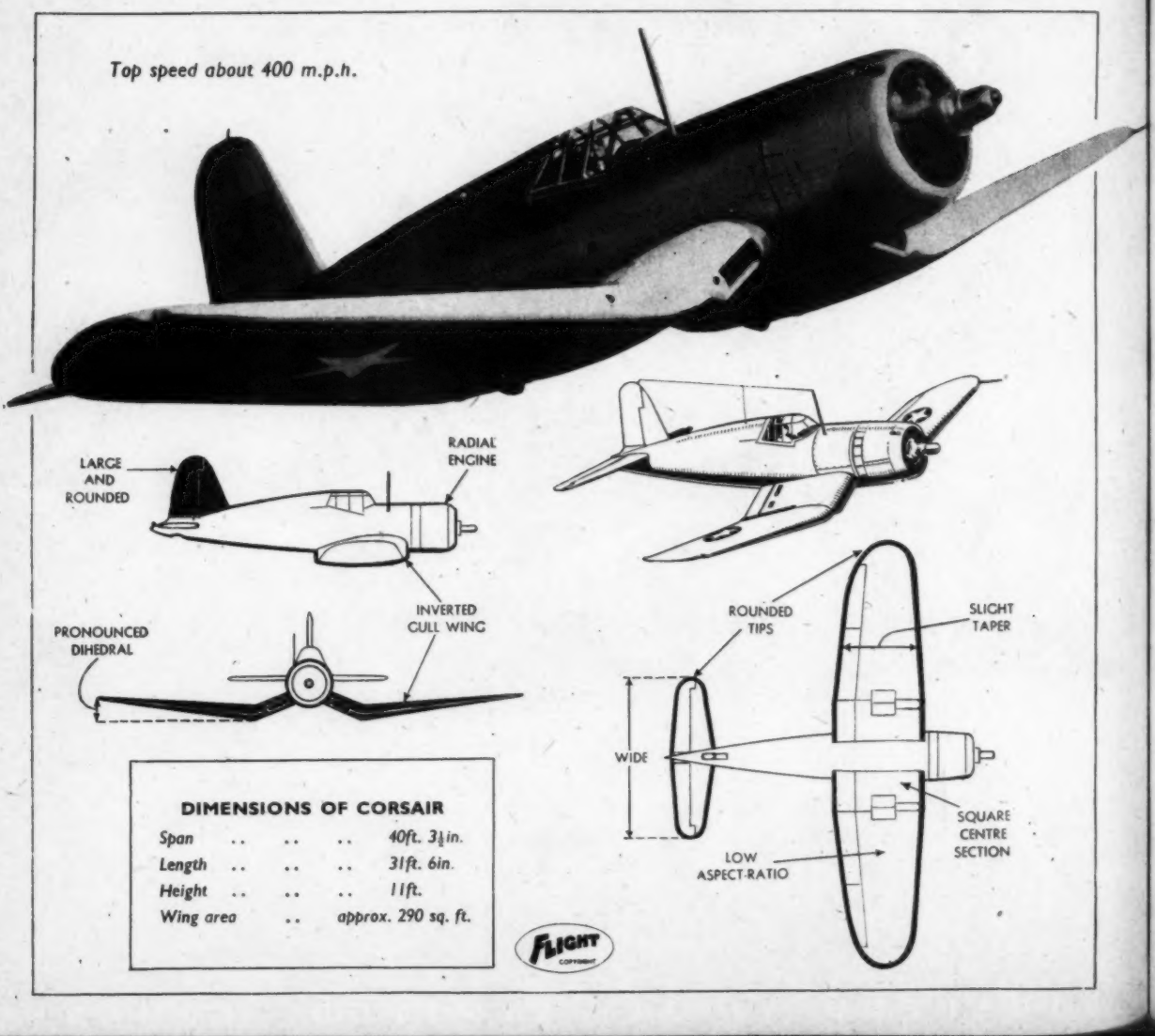
ONE is now growing accustomed to abnormally high top speed claims whenever a new type of American fighter is publicised; wildly exaggerated claims, it will be recalled, were made for the Lightning shortly after its initial appearance, and there have been other instances.

Now it rather seems as if the U.S. Navy's latest single-seater fighter, the Vought-Sikorsky Corsair, or F4U-2, is a similar subject for this particular brand of "ballyhoo," which, it also appears, has been put over so successfully that even the usually cautious B.B.C. recently fell for it. Most of us, however, are inclined to receive the claim for a *cruising* speed of over 400 m.p.h., recently made for this fighter, with a certain amount of reserve to say the least of it. It was not so very surprising when the daily newspapers gave wide publicity to this claim, but it came almost as a shock to hear it announced as an item of official news, since the British public has grown accustomed to placing complete reliance on statements broadcast by the B.B.C. The machine's top speed was said to be appreciably higher!

In any case, due allowance has to be made as between speeds achieved during makers' tests of the aircraft and those possible when loaded up with all its operational equipment. No doubt the Corsair, with its 2,000 h.p. Pratt and Whitney Double-Wasp 18-cylinder engine, exceeded the 400 m.p.h. mark fairly comfortably before it was saddled with its full operational equipment, but it is its speed in actual fighting trim that counts.

When the Corsair first appeared, as the F4U-1, its Double-Wasp was then rated at 1,500 h.p. at 2,400 r.p.m. at 7,500ft., with 1,850 h.p. for take-off. The top speed was then quoted at 366 m.p.h., so with the Double-Wasp boosted to its present 2,000 h.p., a top speed of 400 m.p.h. plus might reasonably be expected; cruising speed, however, is another matter. That it is the fastest fleet-fighter in the U.S. Navy may be accepted without question.

Its main characteristic is the inverted-gull type wing which is more heavily cranked than that of the Master but rather less so than that of the Ju 87. In plan its low-aspect-ratio wings taper slightly to broad round tips, but the wide-span tailplane has a higher aspect ratio; the undercarriage retracts backwards and the tail wheel is also retractable. Complete armament details are not available, but it includes six machine guns in the wings, presumably of 0.5in. calibre.

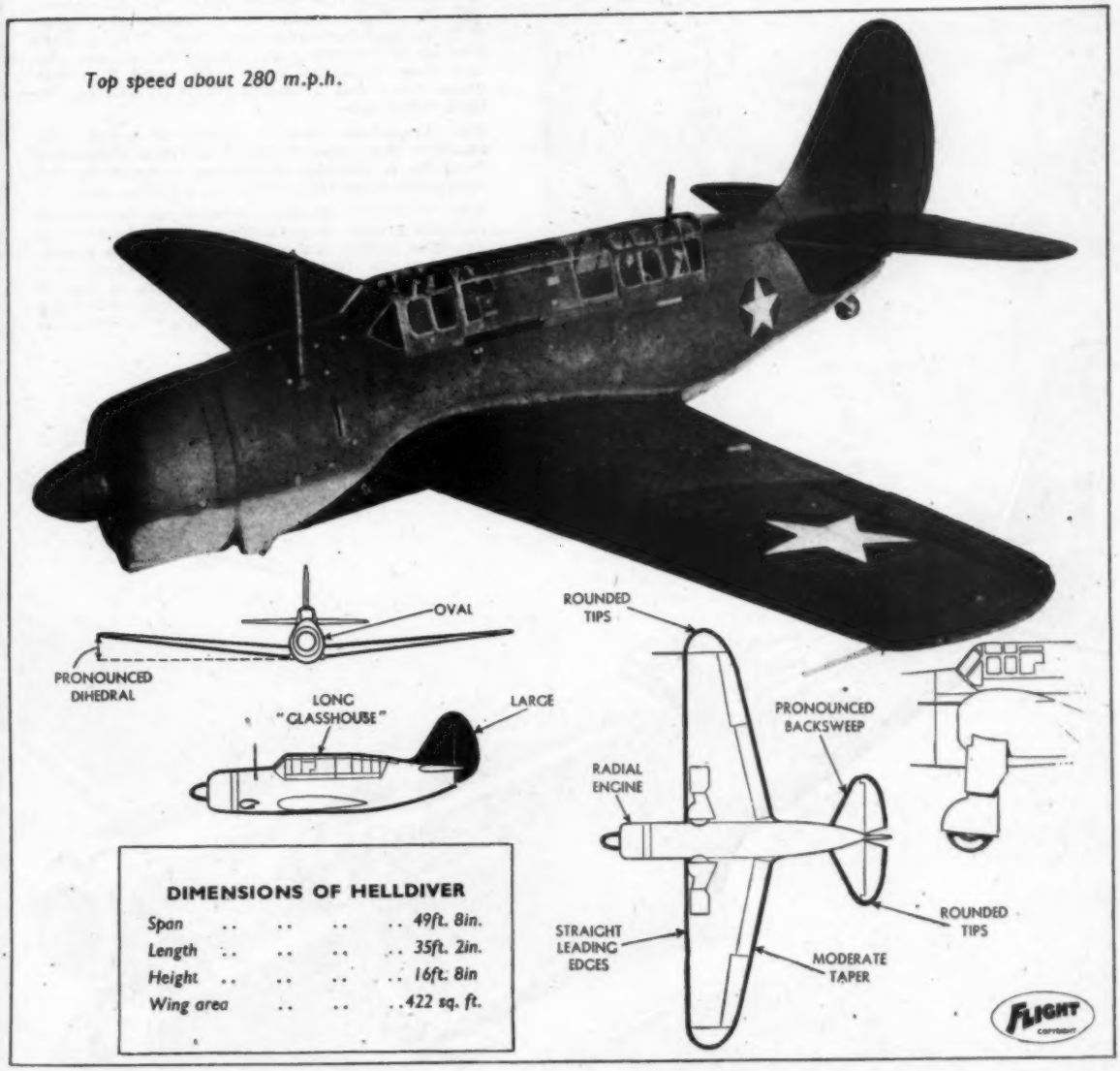


DIMENSIONS OF CORSAIR

Span	*40ft. 3½in.*
Length	*31ft. 6in.*
Height	*11ft.*
Wing area ..	*approx. 290 sq. ft.*

dheir Characteristics

CURTISS HELLDIVER



DIMENSIONS OF HELLDIVER

Span	*49ft. 8in.*
Length	*35ft. 2in.*
Height	*16ft. 8in*
Wing area	*422 sq. ft.*

DESIGNATED the SB2C-1 in the U.S. Navy, the Helldiver is the latest of a long line of dive-bombers designed and built by Curtiss. All of them were popularly known as helldivers, but the SB2C-1 is the first to be given this name officially. Incidentally, all its forebears were biplanes, the first of them appearing as long ago as 1928 in the form of an improvised two-seater fighter. The last of the biplane series was, of course, the famous Curtiss 77, or SBC-4, a number of which were acquired by Great Britain and named the Cleveland.

Powered by a Wright double-row 14-cylinder Cyclone (GR 2600 A5B) developing 1,700 h.p. at 2,500 r.p.m. at 4,100ft., the Helldiver has a top speed of approximately 280 m.p.h., and carries its bomb load internally. Its armament consists of two synchronised machine guns mounted in the fuselage and firing through blast tubes beneath the engine cowling, and a manually operated "free" machine gun in the rear cockpit.

Its manufacturers claim it to be the world's most efficient dive-bomber, and a good idea of its capabilities may be gauged from the fact that the Navy Department specification to which it was designed called for a dive-bomber which should carry twice the bomb-load of any existing type, double the fire-power of earlier types in the same category, and a flight duration of at least 4½ hours longer than contemporary types, together with a top speed at least 100 m.p.h. faster than such types as the Vindicator. A British version of the Helldiver, Canadian built, is expected to reach a delivery rate of 80 per month.

Constructionally, the Helldiver is of aluminium alloy with Alclad flush-riveted, stressed-skin except for ailerons, elevators and rudder, which are fabric covered. Double split trailing-edge flaps, which also function as dive-brakes are provided, and there are movable slots on the leading-edge near the wing-tips. The fuselage is a monocoque structure built up of bulkheads and stringers. The tailwheel is retractable and steerable.

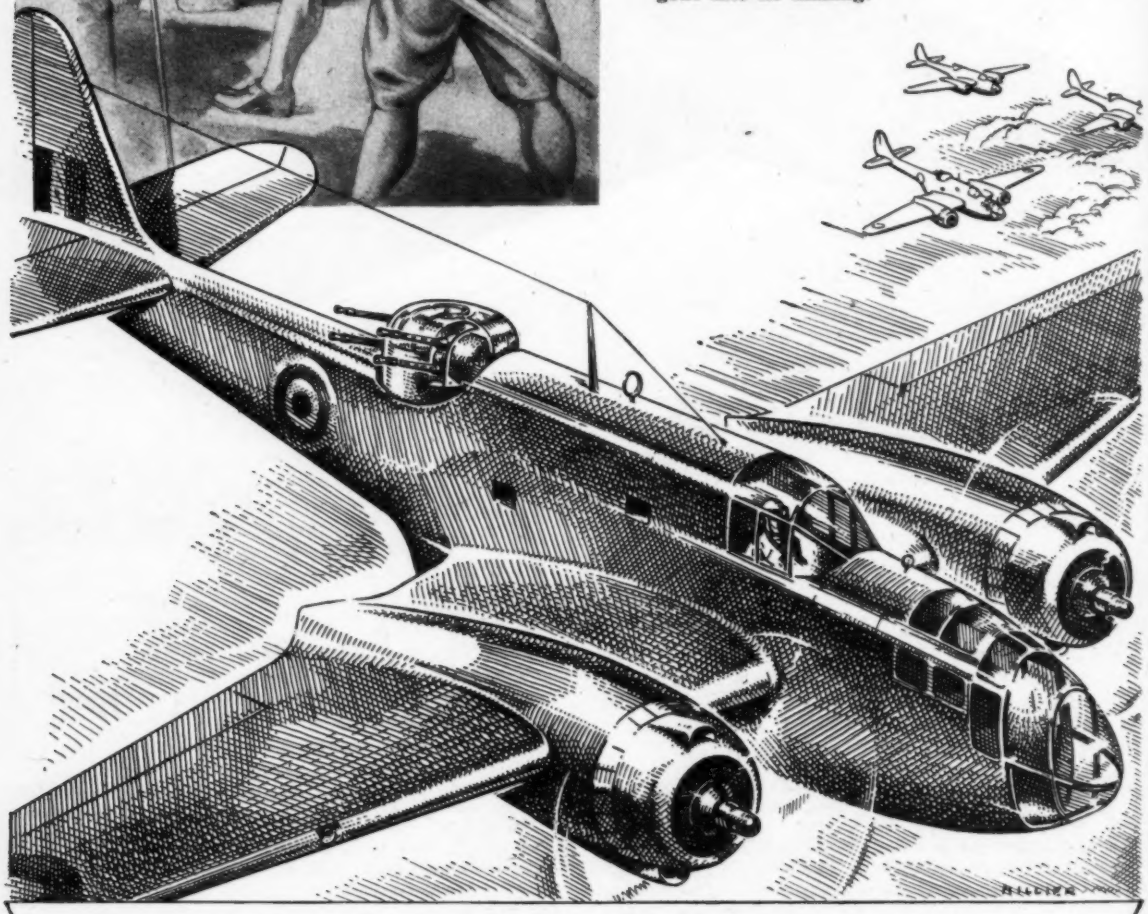
Recognition features include a straight leading-edge and moderately tapered, or forward swept trailing-edge, long "glasshouse," and large rounded fin and rudder.

WEAPONS OLD AND NEW

KNOWN as the "hande gunne" or Arquebus, this first portable fire-arm depended more on the fear-inspiring effect of its report than on its accuracy or destructive power. In fact these weapons were only used in battle when there was a liberal escort of bowmen to back them up.

The Arquebus took a variety of forms, the example illustrated being of the type which was fired by a smouldering taper brought by the operation of the trigger on to a priming pan.

The trend in modern armament is always towards greater destructive power and accuracy, qualities which can only be achieved by pains-taking application of engineering knowledge and skill. The aircraft gun turret is a typical example, and the results it is daily achieving are a fitting tribute to the infinite care that has gone into its making.



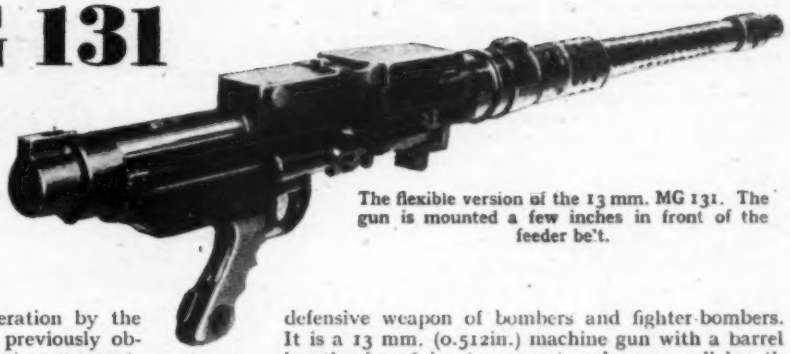
BOULTON PAUL

GUN TURRETS

BPA

The MG 131

A Weapon for Bombers and Fighter Bombers : Construction and Performance : Variety in Application



The flexible version of the 13 mm. MG 131. The gun is mounted a few inches in front of the feeder belt.

AIRCRAFT recently put into operation by the *Luftwaffe* bear witness to the previously observed tendency to increase their armament. This applies equally to the installation of weapons for offensive and defensive purposes. Thus the Henschel He 129 mounts two 7.9 mm. MG 17s, two 15 mm. MG 151 guns, and a Mk 101 cannon of 30 mm.

Similarly, the Me 109 G-2 has an armament consisting of two 7.9 mm. guns, one Mauser MG 151/20 20 mm. cannon, and provision for another gun of this type.

It will be remembered that the Fw 190 mounts two MG 17s with interrupter gear and 1,000 rounds each (chiefly used for aiming and therefore firing a large proportion of tracer ammunition), two MG 151/20s with a motor-driven interrupter gear, and two Oerlikon FF cannons with ammunition drums in the wings containing 60 rounds.

The standard machine gun of German fighters remains, however, the MG 17 of 7.92 mm. (0.303in.) calibre, manufactured by the Rheinmetall-Borsig Company. The gun has an approximate length of 47.2in. (120 cm.) and weighs just under 28 lb. (13 kg.). Without interrupter gear its rate of fire is 1,100 r.p.m.

It may be noted that the armament of German aircraft, while thus showing that increase which is a characteristic feature of development in this war, is confined to a few standard types and their varied application. These few types, the MG 17, the Mauser 151/15, the Mauser 151/20, and the Oerlikon FF cannon, were discussed in the comprehensive review of fighter aircraft armament published in *Flight* of November 12th, 19th and 24th, 1942.

While the MG 17 still appears to be holding its own on fighters, the MG 131 is destined to become the standard defensive weapon of bombers and fighter-bombers. It is a 13 mm. (0.512in.) machine gun with a barrel length of 21.65in. (550 mm.) and an overall length with flash-damping tube of 46.06in. (1,170 mm.). It has a rate of fire of 900 rounds per minute and a muzzle velocity of 2,500 ft./sec. (750 m./sec.). It can be installed either in lenticular mounts or on gun rings, singly or in pairs, or rigidly mounted and remotely controlled.

Ahead of the stationary gun casing is mounted the return mechanism ,which, in addition to a return spring, comprises a revolving locking sleeve and the coupling device between the barrel and the breech, while the rear end of the gun is formed by the recoil spring casing. The ammunition feed, which is actuated by a lever system, is situated above the breech casing.

Method of Operation

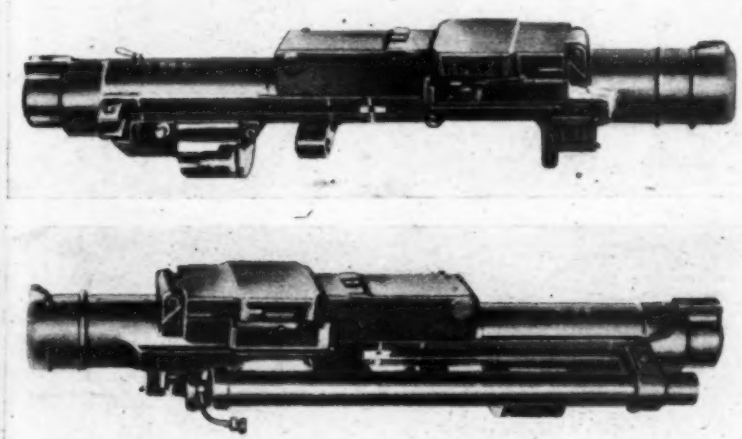
Upon a round being fired, the barrel and breech remain firmly locked and are forced back together by the recoil until the projectile has left the barrel. Thereupon the unlocking process, and the separation of the breech from the masses sliding rearwards with the barrel, is initiated by the revolving locking sleeve; with the acceleration of the breech occurs a deceleration of the recoil masses, which then make the return stroke under the action of the return spring.

In the course of this operation the breech mechanism has extracted and ejected the empty cartridge case; simultaneously with the forward motion of the barrel the feeder mechanism delivers the next cartridge to the breech, so that upon the completion of the forward stroke and the relocking of the barrel and breech the gun is again loaded, the bolt cocked and the arm in a firing position.

Both fixed and flexible versions are fed from an adjustable and disintegrating metal belt.

The pneumatic loading system comprises a compressed air container, charged to 2,200 lb./sq. in., from which compressed air is fed via a pressure-reduction valve which reduces it to 441.18 lb./sq. in. The loading operation is effected by a spring-loaded, single-acting piston, and is electrically controlled by a shut-off valve in the compressed air feed system. Firing is also controlled electrically and effected by means of a solenoid.

The ammunition of the MG 131 consists either of high-capacity explosive shells or solid armour-piercing projectiles also provided with a tracer charge. The explosive shell has a

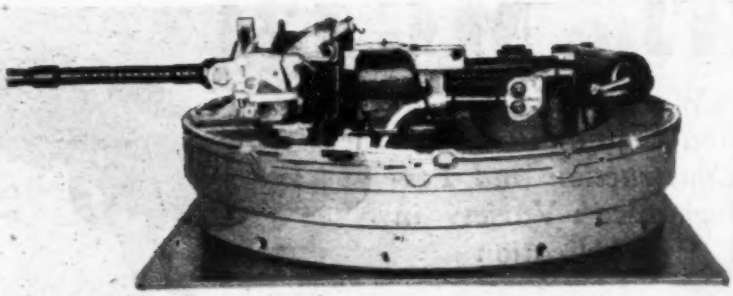


(Above) The breech body, with and without the pneumatic remote loading device mounted on the side, and (right) the complete gun as mounted rigidly in wings or fuselages.

THE MG 131

supersensitive impact fuse and is completely bore-safe; the armour-piercing projectile is a hardened, pointed-nose bullet. The tracer charge of both projectiles is located in a drill cavity at the rear end of the body and burns for about 1.7 sec. Weight of the explosive shell is 1.2 oz. (34 gr.); that of the explosive charge 0.043 oz. (1.2 gr.), and that of the explosive cartridge 2.65 oz. (75 gr.).

On the Me 210 the MG 131 is installed in two power-operated "barbettes," one on each side of the fuselage, with a total provision of ammunition of approximately 1,000 rounds. Both guns are sighted and remotely controlled by the rear gunner, and can be elevated approximately 35 deg. above or below centre. Laterally each gun can fire from dead astern to 45 deg. rearwards.



The MG 131, mounted on an electrically operated gun ring, showing the chute for spent cartridge cases and belt links and the reflector sight.

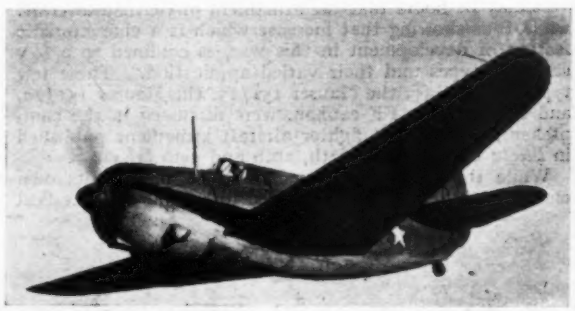
This installation and operation of the MG 131, discussed in detail in the review of the Messerschmitt Me 210 A-1 in *Flight* of February 11th, 1943, is typical of the ingenious and yet complicated German approach to the solution of technical problems.

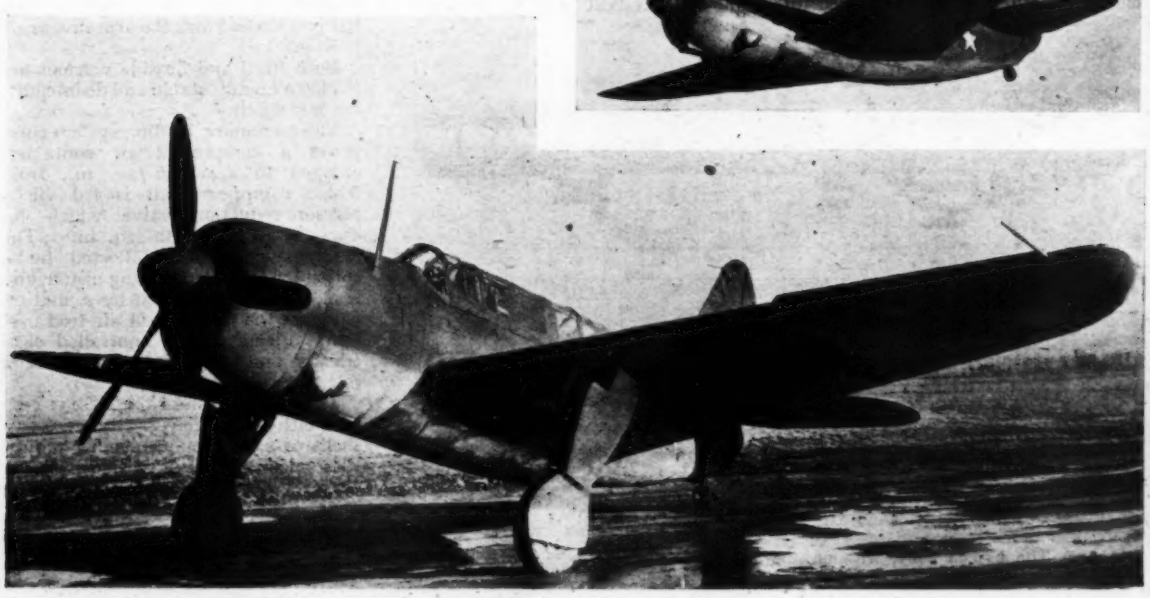
ARMY HELLDIVER IN PRODUCTION

QUANTITY production of a new Curtiss dive-bomber has been under way for some time at a plant of the Curtiss-Wright Corp. in Missouri, U.S.A., and Guy W. Vaughan, president of the Corporation, announced late in January the delivery of the first craft to the U.S. Army Air Forces last Christmas Eve, following "very satisfactory" flight tests made by Harvey Gray, the company's veteran test pilot and manager of flight operations at the Missouri plant.

This new model, designated the Curtiss A-25, is an Army version of the U.S. Navy SB2C-1 Helldiver, previously and also now in production by the company, and, it is said, "has been recognised by American naval officers and British aviation experts as the best dive-bomber in the world."

The present design of the A-25 is so similar to the SB2C-1 that minor changes which can be made in the field will adapt it for naval use. It is a two-seat, mid-wing monoplane powered with a 1,700 h.p. Wright Cyclone engine and is equipped with a Curtiss three-bladed electric variable-pitch airscrew and a retractable undercarriage. All details of bomb capacity, armament and performance are withheld, as is usual in introducing new U.S. types; it is claimed to have higher speed, longer range and greater striking power than any dive-bomber now in service.



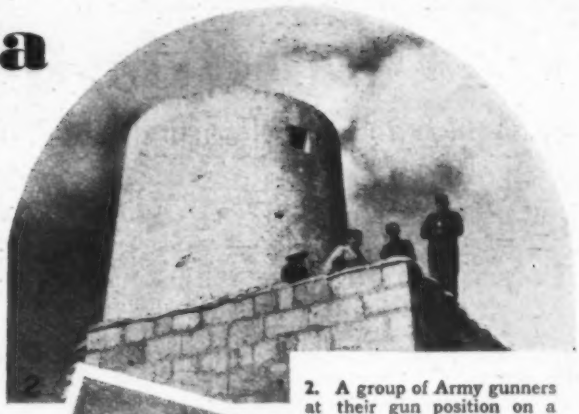


Dive bomber for the U.S. Army Air Forces. These pictures supplement one published in our issue of February 18th. The U.S. Navy's Helldiver is dealt with on page *b* of this issue. Externally there is little difference between the two models. The engine, a 1,700 h.p. Wright Cyclone, drives an electrically-operated airscrew.

Help in Malta

The Army Lends a Hand to Keep the R.A.F. Flying

1. Soldiers manhandling a Bristol Beaufighter to its dispersal pen.



2. A group of Army gunners at their gun position on a disused mill.

3. Helping armourers to rearm a Spitfire with drums of shell ammunition.

4. Fitting fins and loading "dollies" at the bomb store.

5. To conserve petrol the Army travel by bicycle to and from their duties at dispersal points. Many lorry miles are thus saved.

6. Making blast-proof pens out of empty four-gallon petrol tins. Filled with earth or sand these make excellent building bricks.

7. Backing a tropicalised Spitfire V into its dispersal pen. All through the most difficult times when Malta was being heavily strafed the Army has been most generous in its help to the R.A.F.

Notes from a Test Pilot's Diary—I

Looking Around

Should a Test Pilot Examine His Aircraft Before Flight? : The Author Answers "Yes"

By "WITNESS"

THE object of these notes is to give readers of *Flight* an insight into the day-to-day problems which confront the test pilot engaged on flying production aircraft. Perhaps the context may serve to illustrate how the art of testing consists of developing the powers of observation, of detective work, and of abusing a machine intelligently, rather than the series of dizzy dives followed by frequent parachute descents with which Hollywood has branded our profession.

Should the pilot inspect the aircraft he is going to test before he flies it? Some think it is rather odd to see a pilot walking around his machine before he enters the cockpit. After all, they say, the machine would not be given a "1090" (Certificate of Safety before flight) unless it had been carefully scrutinised from the earliest stages of its construction by works inspectors and then re-checked by the A.I.D. And, anyway, in more than ninety-nine cases out of a hundred, if there is anything amiss it is the sort of snag which could not, it is argued, be revealed by a cursory inspection.

THE author of these notes is a well-known test pilot. In this series he will deal with some of the many day-to-day problems that arise during the testing of production aircraft.

"Witness" advocates, in this first article, a careful inspection by the pilot before the first flight. We recall a rather cruel joke perpetrated on a very careful pilot in the early days: A "friend" placed a small nut on one wing, and the pilot spent nearly a whole day trying to discover the bolt from which it came!

So it is that many pilots continue to get away with a policy of not beginning to look for trouble until they are strapped snugly into "the office."

However, as a means of increasing one's potential flying hours there is something to be said for looking before you leap and of snooping before you climb aboard. I can recall at least three occasions on which a pilot saved himself embarrassment by inspecting or suffered through failing to do so. Once I discovered a loose screw from an inspection cover working its way out to the point where it could have jammed the aileron control rod, and so would have deprived me of lateral control.

On several occasions a slight drip of oil from the rear of the radiator housing has led me to discover that the oil radiator had burst. This might have entailed landing with an empty oil tank and a seized engine had the machine been flown.

Pilots have landed and complained of some peculiar elevator snatch which could immediately be traced to an inspection cover locked in the open position; this could easily be seen on walking around the machine.

Occasionally a piece of cowling comes adrift in the air, and, although it does not follow that the fasteners were undone when the machine took off, this has sometimes been the case; it could have been spotted by a careful external check.

One may be discouraged from inspecting the aircraft before flight by the monotonous frequency with which nothing irregular occurs—not even a tyre under-inflated—but as an insurance policy the preliminary look-round is worth while. The time taken is less than a minute, and in the long run those few seconds may save some anxious moments, or even a brush with the Grim Reaper, during the course of flight.

Another factor which now makes it more than ever necessary to eliminate an extra flight due to faulty inspection is that of economy. There was a tendency early in the war to talk of economy in test flying which could be achieved by cutting down the duration of flight and, therefore, the comprehensiveness of the test. That had to be resisted because wartime conditions—dilution of labour and increased inspection tolerances—tended to throw more and not less responsbility upon the test pilot, who is, to all intents and purposes, the final inspector. Until he is satisfied with the aircraft, it cannot be handed over to the Royal Air Force.

But economies *can* be achieved by more careful checking on the ground, and it is here that the pilot's inspection before flight may save many gallons of 100-octane fuel. For instance, the oil-cooler shutters, which require to be fully open in summer and almost closed in winter, and can only be adjusted on the ground on some aircraft, may have been set closed on a hot summer's day. The pilot climbs aboard without noticing, and the result is that, halfway through his test, he finds his oil thermos "off-the-clock," and is compelled to throttle back, return to the airfield and start his flight all over again.

A modern fighter uses about 1½ gallons per minute, a twin-engined bomber about 3 gallons per minute, and a four-engined bomber about 6 gallons per minute under test conditions, so that even an extra five-minute circuit of the field may waste from 7½ to 30 gallons of that precious fluid which is brought here by the bravery and devotion of our Merchant Navy. By taking that little extra care in inspection we can prevent their efforts being wasted.

CANADIAN ANSON V

THE Avro Anson Mark V is the latest model of this twin-engined bomber-trainer to come from Canadian factories. It was given its tests before Royal Canadian Air Force officers late in January. The Mark V is equipped with Pratt and Whitney radial motors instead of the Jacobs engine used on previous Canadian-built models, giving it greater speed, manœuvrability, and an increased safety factor.

The redesigned interior of the Anson gives more room for student navigators and observers, and the moulded plywood fuselage makes it far quieter and warmer than its predecessors. Its normal crew is a staff pilot, a navigation instructor, two navigator pupils, and a wireless operator pupil. There is a bomb-aimer's compartment in the nose for bomber pupils. The Anson is made by the Government-owned Federal Aircraft, Ltd., and an order for more than 2,000 of the Mark V has been given the company.

A Mark VI has already been placed on the boards, differing in that it has a power-operated turret and will be used for gunnery training. Work on the Mark VI starts as soon as the Mark V order has been completed.

Japan's Gliders

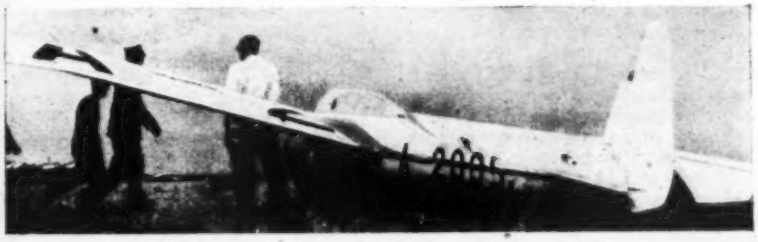
Design and Construction Begun in 1937 : The Use of Local Materials : German Types Copied

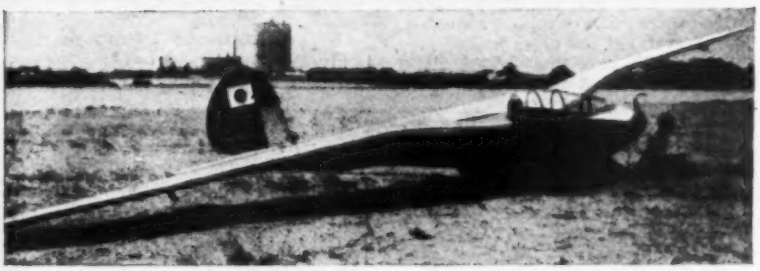
HIKARI 6: A two-seater designed by Takagi and constructed in wood strongly resembles German types.

WHILE operations in the Far East are gradually lifting the veil of secrecy with which the Japanese shrouded their aircraft before the war, their gliders are still hidden in mystery. Since gliders have not been hitherto employed in the operations of the Japanese Air Force, little, if anything, is known of their existence But it would be wrong to conclude that troop- or freight-carrying gliders are not available.

The gradual growth of Japanese glider production in the pre-war years is indeed an indication that this branch of flying has not been neglected. In 1937, 89 gliders were built in Japan; in 1938 184, and in 1939 about 600, excluding those built for export. Thus a nucleus glider industry has been in existence for some years now, and it can be assumed that it has since been expanded.

Type.	Span (ft.)	Length (ft.).	Wing Area (sq. ft.).	Aspect Ratio.	Weight. Empty (lbs.).	Weight. All-up. (lbs.).	Wing Loading. (lb./sq. ft.).	Gliding Angle.
Itoh C.6	55.7	55.8	182.9	17	396	555	3.07	23
Itoh D.1 (2-seater)	59.8	23.65	198	17:7	485	815	4	24.5
Hikari Rokko 2	50.2	19·	156	16:2	387	553	—	25
Hikari Rokko 1 (2-seater) ...	52.4	22.31	222.2	12:4	460	790	3.5	21.5
Hikari (2-seater)	52.4	22.31	215.2	—	570	920	—	21.4
Mayeda-Rokko I	60.9	20.41	177	1:20	341	500	—	—
Sotoh T.C.	49	19.6	161.4	16:2	330	496	3.07	24
Nippon Ohtori	42.6	21.72	141.6	13:2	275	400	3.15	24.5
Nippon Washi (2-seater) ...	62.3	26.2	247.5	15:7	460	790	3.27	—





(Above) MAYEDA-ROKKO I: Single-seater glider designed by Kenichi and built by the Fukuda Mayeda Company. The glider is constructed in plywood and plastics.
(Below) THE SATOH T.C.: Has a span of 49ft. and an all-up weight of 496lb.

Data of the larger glider types produced by this industry are, of course, not available, but some details are given in the above table of the single- and two-seater training and high-performance types developed.

Foundations for the Japanese glider production have been laid by the Fukuda Mayeda Light Aircraft Works of Osaka, which have been building gliders since 1937. The construction, while to original designs, has been based on German models, with plywood and plastic employed as structural materials. The closer collaboration in other spheres with Nazi Germany and the existence of suitable material resources may serve as a further indication that Japan will pay due attention to the production of military gliders. Doubtless the German examples will be followed here, too.

PRIZES FOR GOOD IDEAS

THE Canadian Government has started a nation-wide plan to encourage aircraft workers to submit suggestions for the improvement of efficiency and production in aircraft plants, it was announced by Ralph P. Bell, Director-General of Aircraft Production. The Government will award annually certificates of merit to twenty-five workers in Canadian aircraft plant, each certificate carrying a prize of $25. In addition, the individual plants will give prizes determined by a percentage of the saving resulting from the suggestion, varying from $2 to $500.

To combat the high fees of commercial schools which collect from their students after the student has been placed in a post in an aircraft factory by the school, the Ontario and Quebec Government, with Federal Government assistance, are opening schools properly staffed and charging a nominal fee, it was announced recently by Hector Perrier, provincial secretary in the Quebec Provincial Government.

Recognition Charts

A set of three charts of British, American and German aircraft, each printed on paper 29 × 19 inches, depicting head-on, broadside, overhead and underside views of the leading types, are now available from these offices, price 2/- net, or by post 2/2.

Each chart is also available mounted on card, varnished, eyeletted and corded, at 2/6 net, or by post 3/-; or the three mounted charts can be supplied together by post for 8/3.

Air Estimates Debate

Functions of R.A.F. Transport Command : Civil Aviation Policy : New Post-war Types to be Designed

AMONG the many points and issues raised in the House of Commons during the recent debate on Air Estimates (and which filled more than 100 pages of Hansard), four subjects may be singled out here for a brief review, as being of primary importance at the present time. They are the newly formed Air Transport Command, the Government's policy on civil aviation, the matter of designing post-war civil aircraft, and finally, statistics given by Sir Archibald Sinclair, Secretary of State for Air, on the activities during the past year of the R.A.F.

Announcing the formation of the new command, Sir Archibald had told the House that, with an increased number of transport problems, an organisation would be required to control their operations throughout the world. He had, therefore, decided to establish a Royal Air Force Transport Command. In addition to controlling R.A.F. transport squadrons at home, the command would be responsible for the organisation and control of strategic air routes, for all overseas ferrying and for the reinforcement moves of squadrons to and between overseas theatres. The R.A.F. Ferry Command at Montreal would become a subordinate formation.

British Overseas Airways Corporation would continue as a civil organisation, Sir Archibald added.

A Matter for Concern

There was a great deal of discussion on the topic of civil aviation after Mr. Burke (Burnley) had moved that the House, appreciating the important part which civil aviation would play after the war, should urge the Government to adopt a policy which would ensure the immediate development of civil aviation at the conclusion of hostilities. He pointed out that there was world-wide interest in the subject, which was going to have a tremendous effect on the economic and social future of mankind in general. He was, he said, a little concerned about the great interest which was being taken by the shipping companies, three of which, at least, had been trying to get guarantees from the Minister that they would be able to function in air transport when the war was over. He hoped the Government would see that the future of civil aviation was not tied up with either shipping or railway interests. They should get away from the competitive notions of the 19th century and look upon civil aviation not as a profit-making concern but as something of service to our own people and to mankind.

The men who were running the U.S. Army Transport Command were commercially minded people who were running it with a civil point of view. Indeed, what had happened in America was that the military had handed over the business of its transport to commercially minded people whereas, in Great Britain, civil transport had been turned over to the military.

One Chosen Instrument

After several other members had expressed themselves on a variety of points, Sir Archibald Sinclair said they must all keep an open mind as to what must be done after the war, but he was not at all sure that, when the time came, it might not be wise to continue civil aviation under the Air Ministry which had already obtained so much practical experience in that field. It remained the policy of the Government to employ one chosen instrument to organise control of overseas air transport services, but it was one of the things which were being brought under consideration by the Government and he was not prepared, at that moment, to prejudice that issue.

Later, Sir Archibald Sinclair referred to the committee set up under Lord Brabazon to consider broadly the types of post-war civil aircraft likely to be required. That committee had lost no time and had recommended that work should start immediately on the design of civil aircraft of new types, which they defined in very general terms, and on the preparing for the conversion of military aircraft. The war cabinet had accordingly taken the decision that the design of a limited number of types of civil aircraft should proceed with the assistance of the Government, as and when it could be arranged without interfering with work on aircraft required for the war. They would, in association with the industry, do their utmost to organise design staffs of the high calibre required, so that they may start without delay on the design of some, at least, of the new types recommended and on conversion work. The Government was also giving close attention to the organisation of civil air transport on the international plane after the war. But he thought the unregulated "freedom of the air" would inevitably mean fierce competition and the continuation of high, uneconomic subsidies. In the view of the Government, some form of international collaboration would be essential if the air was to be developed in the interests of mankind as a whole, trade served, international understanding fostered, and some measure of international security gained. The problems were immense and could not be solved by one country alone.

Reviewing the accomplishments of the R.A.F. in the early part of his statement, Sir Archibald Sinclair said it had fought hard and expanded rapidly.

"Year by year," he said, "we ask more of our pilots and crews and give them larger and faster aircraft and more complicated equipment to use." New training methods had been adopted, courses lengthened, and the standard of navigation raised. In fact, they had raised the standard and lengthened the period of aircrew training at a time when the enemy had been forced severely to reduce the length of his training courses and to accept a lower standard of aircrew efficiency—and the fruits of this were reflected in the greatly increased impact of the R.A.F., and especially of Bomber Command, on the enemy. He paid a tribute to Canada, Australia, New Zealand, South Africa and Southern Rhodesia for the increasing numbers of their production of highly trained aircrews, and referred to "the admirable work" of Maintenance Command, which, from small beginnings, now handled everything the R.A.F. required from a Lancaster to a pair of boots—a list totalling some 750,000 different items. Maintenance Command received on the average over 60,000 demands a day, and throughout last year handled equipment and stores at the rate of six tons a minute, night and day.

Triumphant Typhoons

Dealing with the soundness of the defences of this country, Sir Archibald mentioned that in December, January and February 46 enemy aircraft were destroyed out of the 392 which had crossed our coast by day, in addition to a large number probably destroyed and damaged. The most notable feature of our defence against sneak raiders had been the remarkable success of the Typhoon squadrons in catching and destroying them.

In the war at sea all the operational commands of the R.A.F. at home had played their part, and nearly 50,000 fighter sorties had been flown in 1942.

In the Middle East, between the opening of the Battle of El Alamein on October 23rd and the end of February, 1,075 enemy aircraft had been captured—some of them intact—besides 402 destroyed in air contest; this was a total of 1,477 destroyed and captured as against our own loss of 345. At Malta we had shot down 917 enemy aircraft for the loss of 363 during the past year.

Laminated Plastics

German Commentary on Spitfire Seat : British Manufacture of Paper and Fabric Laminations : Cresylic and Phenolic Resins Used

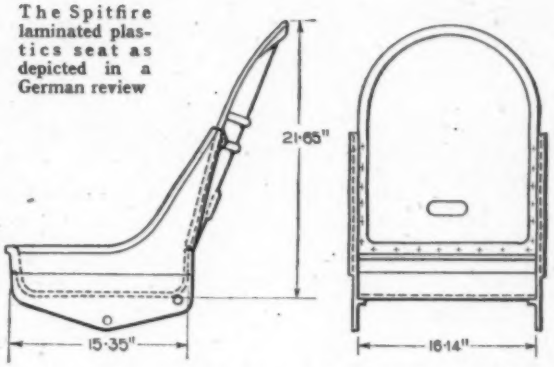
A CRITICAL commentary from a German source on a British innovation in aircraft construction which has fallen into their hands has recently been published. It concerns the pilot's seat of a Spitfire aircraft and the discovery that it is of moulded laminated plastic construction rather indicates that the German industry is somewhat astonished by the adoption of plastics in place of light alloy for this unit.

The German review explains that the seat combines the parachute seat cavity and a backrest. To mould the seat as a single unit would have required the use of very complicated moulds, and due to this limitation of moulding technique the seat is made up of four parts joined by countersunk screws. The plastic used corresponds to the German type Z.3 with a resin content of about 60 per cent.

Continuing, the review states that the quality of the moulded parts differs considerably in different examples of the seats that have been recovered. Resin segregation and deformation in the laminations are frequently encountered, and in general can be traced to insufficient preparation and faulty laying of the paper sheets. Edgings and strengthening ribs are frequently produced in a manner not strictly in accordance with the known properties of the material being used. No data on the behaviour of the seats in service are available in Germany, but the view is expressed that as they are used in great numbers presumably they are satisfactory.

Suggesting that the reason for the introduction of the seat may be sought in a desire to employ this material in place of aluminium alloys, which are becoming restricted in England, and also to save labour, the review concludes by stating that in any case the large-scale employment of a supporting structure of this type is a remarkable venture in the use of laminated plastics. Faults in the moulding technique used are due only to insufficient experience in design. A sketch of the seat in question is presented in the review. It is reproduced here, with the dimensions given in English units.

The Spitfire laminated plastics seat as depicted in a German review



Frequent reference has been made in the American technical Press from time to time of pilots' seats manufactured in moulded plywood by the aid of plastic resins, but the use of laminated plastics for this component has been a well-kept secret, and at the present time no official description of this particular seat, or others of similar construction, is permitted. The German account is given for what it is worth. It does, however, go to prove that considerable advancement is definitely taking place in the British plastics industry applied to aircraft production.

LAMINATED PLASTICS (Paper and Fabric)

Tensile strength ranges from 8,000 lb. to 22,000 lb./sq. in. according to the grade of material. These materials as described are manufactured to B.S.S. 316, 547, 668 and 972.

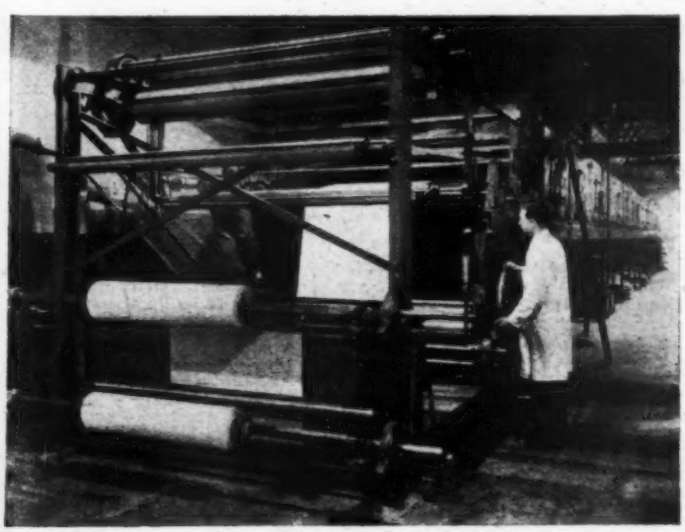
For reasons already stated, the particular process involved in manufacturing pilots' seats of a laminated plastic material cannot be disclosed, but in view of the increasing use of this material for various units in aircraft construction, a brief description of the manufacturing process of laminated plastic material in general may be of interest. The process has no bearing whatever upon the manufacture of the pilot's seat referred to, which demands a specially developed technique.

Paper and fabric are the materials most commonly used, and they are supplied to the plastics industry by their respective manufacturers, and processed to eliminate all foreign matter. In the case of paper material the thicknesses most commonly used are of 2, 5 and 10 mm. Specialised plant and equipment becomes necessary, and the process described in these notes is one carried out by a firm of prominent plastic manufacturers who are specially equipped for the production of both paper and fabric laminations.

The Manufacturing Process

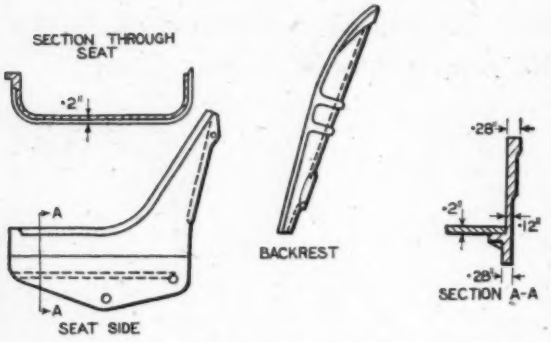
The process starts at the impregnating machine, which includes a resin bath and a drying chamber, the whole machine being approximately 120ft. in length.

On this machine a large roll of either paper or fabric, according to requirements, is automatically unwound. After passing over a series of rollers, the material being kept taut meanwhile, it is led through the impregnating bath of synthetic resin. In this particular case either cresylic or phenolic resins are used. Here the



Paper being fed into the impregnating machine, which incorporates a resin bath and a drying chamber. The machine is 120ft. long.

LAMINATED PLASTICS



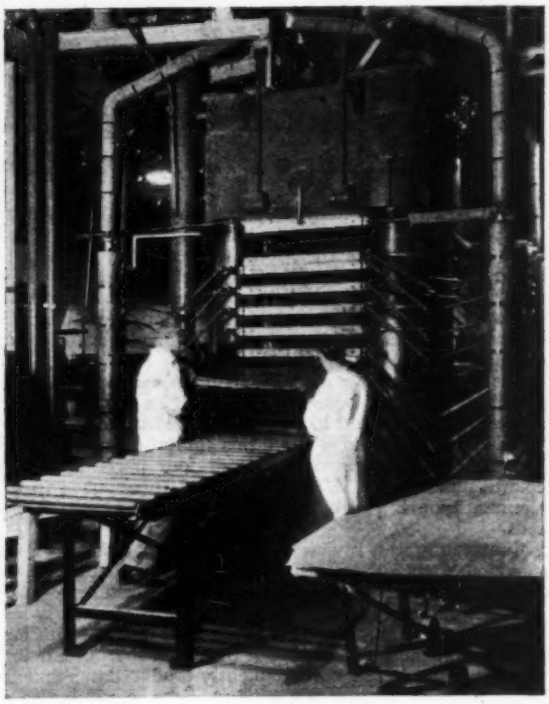
Details, from a German review, of a Spitfire laminated plastics seat. It is made in four parts, owing to limitations of moulding technique.

material is impregnated with the resin as it slowly passes through; leaving the bath, it is immediately fed into the drying chamber.

This chamber, which is approximately 90ft. in length, is kept at a temperature of about 85 deg. C. for paper material. In the case of fabric material, however, the temperature is increased to 100 deg. C. Hot air is drawn into this chamber from underneath, and the forced draught causes the material to "float" as it passes through. In other words, the material does not come into contact with the floor of the drying chamber. Having passed through the chamber the material emerges in a dry state, and is then automatically rolled on to a revolving spindle. The roll is then removed to the guillotine, cut into sheets of the required length and stacked ready for the next operation.

This operation is the simultaneous application of heat and pressure. The laminations are arranged according to the ultimate thickness of the material required and placed in the press, where they are subjected to a pressure ranging from 0.5 to 1 ton/sq. in. at a temperature of 40 deg. C., rising to 160 deg. C., thereby causing the resin to flux.

Whilst the material is still under pressure the heat is turned off and water is passed through the platens of the press. This has the effect of cooling the material, so enabling the operators to handle it and remove it from the press. The edges having been trimmed, the material is in its final form, and after passing a rigid inspection it is ready for use. The curing period takes from one to two and a half hours, according to thickness.



Loading a laminating press in which the impregnated material is subjected to the simultaneous application of heat and pressure. The former ranges from 40 deg. C. to 160 deg. C., and the pressure from 0.5 to 1 ton per sq. in.

Laminated plastic material is being increasingly used for certain aircraft fittings and equipment. In addition, it is used extensively in electrical equipment, and also, in its thicker form, for the timing gears of cars and lorries. Although the process described is that of producing the material in the form of flat sheets, it can be conveniently moulded if necessary, and lends itself to this technique.

Book Reviews

Is Bombing Decisive? By Captain F. O. Miksche. George Allen and Unwin, Ltd. 5s. net.

NOT long ago we had the pleasure of reviewing the book *Paratroops*, by Captain Miksche, a Czechoslovak officer attached to the French General Staff. In this later volume he attacks the views expressed by Mr. A. P. De Seversky in his book *Victory Through Air Power*, which has had a great sale in the United States. The Russian-American aircraft constructor set forth the theory that wars can be won solely by bombing important enemy targets from the air, while ground forces would only be needed for the occupation and policing of the areas conquered by the air forces.

We are fully in agreement with Captain Miksche in his belief that this doctrine is thoroughly unsound, and we understand that the British Air Staff holds a similar opinion. Everyone is agreed that air bombing must go on, and that it will diminish the enemy's power of resistance—though to what an extent is a question which it may not be possible to answer until after this war is over. We agree with this author and others (including Admiral of the Fleet Sir Andrew Cunningham) that the final victory will be won by ground armies, strongly supported by all available and appropriate aircraft.

Captain Miksche's book is very closely reasoned, but his arguments are not always easy to follow, probably through shortcomings in the translation. Nevertheless, it repays careful study, and is a useful contribution to the study of strategy as modified by the appearance in this war of what is practically a new weapon, and of the new tactics which go with it.

Coastal Command at War. By Sqn. Ldr. Tom Dudley-Gordon; with a Foreword by Air Chief Marshal Sir Philip Joubert de la Ferté. Jarrolds. 7s. 6d. net.

ONE would imagine that this book would have a poor chance of success, being published so soon after the very excellent official *Coastal Command*. Yet the fact that the A.O.C.-in-C., Coastal Command, has consented to write a foreword shows that there must be something in the book which makes it different from the official history. It is, in fact, a collection of stories of gallant deeds, adventures and curious experiences of men and aircraft of the Command.

Each branch of the manifold duties of this Command are dealt with, and yet no space is devoted to a description of its organisation. Such descriptions are apt to be thought dull by some readers, but this book will give the reader a sound knowledge of the organisation without ever telling him that it is doing so. Some of the stories have been told before, in official communiqués or elsewhere, but they will stand telling again by such a well-informed and graphic writer as Sqn. Ldr. Dudley-Gordon. The book has all the qualities which make for popularity and is well illustrated by photographs.

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

BOMBER ESCORT

Glider Fuel Tanks Suggested

THE correspondence in your columns on the subject of bomber escort has caused me to wonder if consideration has been given to the jettisonable fuel tank in glider form.

The unmanned glider, little more than a fuel tank with wings, could be trimmed to glide slightly higher than the towing fighter, permitting a simple gravity feed through a hose-type towing cable.

Although the reduction of the fighter's speed would be considerable, the quantity of petrol carried by this means would be much higher than by jettisonable tanks fitted to the aircraft itself. At the approach of danger the jettisoning of the glider would leave the unhampered fighter with its full load of petrol.

G. GREEN,
Major, R.E.

THE BEST TYPES OF AIRCRAFT

Do 217E Better than the Mitchell ?

IN reply to Ex-R.F.C.'s letter in "Correspondence" (*Flight*, March 4th), I feel that the choice he has made is very good, apart from one of the aircraft he has chosen, namely, the B.25 Mitchell. To say that the Mitchell is the best medium bomber is, I feel, being rather unfair to the Dornier 217E, as the latter's performance figures, armament, etc., are in nearly all respects higher than the Mitchell's.

I think I am correct in stating that the Dornier is practically universally acclaimed the best of its class. O. W. CARR.

Allied and Axis

IN reply to "Ex-R.F.C.'s" query in your issue of March 4th, I have revised his excellent list and made the following substitutions:—

Spitfire IX for Spitfire V.	Typhoon for Hurricane.
Do 217 for Mitchell.	Marauder for Hampden.
Seafire for Corsair.	Avenger for Barracuda.
Helldiver for Dauntless.	Skymaster for Skytrain.

The list below includes the best type in service with Allies as well as that in service with the Axis air forces, and vice versa.

Operational Type.	Plane.	Nationality.	Equivalent best type in Opposing Forces.
High-level interceptor dog-fighter	Spitfire IX	British	Me 109g.
Medium and low-level anti-bomber and anti-fighter-bomber fighter	Typhoon	British	FW 190.
Heavy Night Bomber ...	Lancaster	British	He 177.
Heavily-armed Day Bomber	Fortress V	U.S.	Do 217e2.
Medium Day Bomber ...	Do 217e2	German	Mitchell.
Long-range Fighter-Bomber (equipped to carry bombs and/or torpedo)	Bristol Beaufighter	British	Ju 88.
Low-level high-speed rec. bomber	D.H. Mosquito	British	Me 210.
Army Co-op. Scout ...	Mustang	U.S.	Me 109f.
Heavy Land Transport	Skymaster	U.S.	Ju 290
Land-based Torpedo Bomber	Marauder	U.S.	Do 217e2.
Short Range Fighter-Bomber	Adapted Typhoon (Hurricane at present)	British	FW 190.
Naval Fighter	Seafire	British	Mitsubishi Navy S-00.
Naval Dive-bomber	Curtiss Helldiver	U.S.	Ju 87. Aichi Navy K-99.
Naval Torpedo-Bomber...	Avenger	U.S.	Mitsubishi Navy G-97-1.
Long-range Naval Patrol	Liberator III	U.S.	Do 22k.

By way of commentary on the above list, the Do 217e2 is well armed, is faster, carries a greater bomb load, and is more versatile than the Mitchell. I have not taken into account the Constellation. This is essentially a civil type and is not yet in quantity production. A Typhoon modified to carry bombs, with its great fire-power, should prove deadly. A four-cannon Seafire should be just superior to a Corsair (practically the same fire-power and speeds, but the Seafire should gain on flying characteristics). As no details have been released about the Barracuda, the Avenger is likely to be the best-known torpedo-bomber for a time. The Helldiver, now in production in quantities, supersedes the Dauntless.

C. C. DAVIDSON.

A Word for the Thunderbolt

WITHOUT altering the operational class I suggest a few amendments to the aircraft type.

First, I am of the opinion that the "Republican Thunderbolt" is superior to the Spitfire Mk. IX in *all* respects at high altitudes. It has a higher ceiling and more manœuvrability than the Spitfire. Furthermore, I am a 0.5in. wallah and I prefer the formidable battery of eight 0.5 m.g.s to the "corny" two 20-mm. cannon and four 0.303 machine guns of the "Spit."

The best all-purpose fighter-bomber is the Whirlwind.

Thirdly, in the naval dive-bomber category the Dauntless is inferior to the Curtiss A-25 Helldiver, which in my opinion will be the basis of all future development in the dive-bomber category.

Finally, with regard to the naval torpedo bomber: I consider it unfair to include the Barracuda because "officially" we know nothing of its merits. I should imagine the Grumman Avenger would compare very favourably with it.

"SQUITA."

More Amendments

BY way of an answer to your correspondent "Ex-R.F.C.," whose letter was published in your issue of March 4th, I should like to submit the following amendments to his list:—

Operational Class.	Aircraft Type.	Nationality.
All-purpose Fighter/Bomber ...	FW190	German
Long-range Fighter/Bomber ...	Me 210	German
Naval Fighter	Seafire	British
Land-based Torpedo Bomber ...	Wellington	British
Naval Torpedo Bomber ...	Avenger	American
Transport Flying Boat ...	BV222	German

You will notice that I have displaced our latest naval torpedo bomber from his list, referring to the Barracuda, not because of information detrimental to its reputation, but because of complete lack of information on its performance. This, I think, is the only amendment that needs any explanation.

Doubtless some of your readers will disagree with me, and I should like to see what suggestions they have to offer.

W. G. ANGLISS.

Some Alternatives

HERE is the list I would think correct. It includes several alternatives and alterations from that of "Ex-R.F.C."

Single-seat fighter ...	Spitfire V	Heavy night bomber	Lancaster
Intercepter ...	Hawker Typhoon	High altitude bomber-reconnaissance	(None good enough)
High altitude fighter	Spitfire IX		
" " ...	Republic Thunderbolt	Low level army reconnaissance ...	Mustang
Long range day and night fighter	Bristol Beaufighter	Naval fighter ...	Corsair
Short range attack bomber	Hurricane	" " ...	Seafire
Long range fighter bomber	D.H. Mosquito	Land-based torpedo bomber	Beaufort
" "	Boston	Naval torpedo bomber	Avenger
Light bomber reconnaissance ...	Mosquito	Naval dive bomber	Dauntless
" "	Boston	Land-based dive bomber	Vengeance
Medium bomber ...	Mitchell	Long range naval patrol	Catalina
" " ...	Marauder	Transport land plane	Stratolina
" " ...	Baltimore	Transport flying boat	Mars
Heavy day bomber	Flying Fortress 2		

R. E. GREGORY.

Sunderland or Catalina ?

"AN Attempt to Rank Leading Designs," by "Ex-R.F.C.," is very good. But in my opinion the palm for classes "Long-range Naval Patrol" and "Transport Landplane" should be given to Britain.

Surely, the Sunderland, although an older boat, is superior to the Catalina, and now that the Sunderland II is in full production I am certain that the credit can be given to Short Bros. Although the American partner in naval patrol is doing a grand job, I think I am justified in saying that Britain leads in this category, which is doing so much in the

CORRESPONDENCE

Battle of the Atlantic and other anti-submarine activities.

With regard to the class "Transport Landplane," I believe another British firm should be given the credit—A. V. Roe and Co., who now have in production the four-engined Avro York.

I think that the York is an answer to M.P.s who are continually stating that Britain is slow in design and production of landplane transport aircraft, although our American Allies have produced many very good examples.

A.T.C. (NORTHAMPTON).

No Rival for the Ju 86P.

I DISAGREE with "Ex-R.F.C." on many of his selections. My list would read:

Single seat fighter ...	Typhoon.	High altitude bomber-rec.	Ju 86P.
Interceptor	Typhoon.	Army Co-operation ...	Mustang.
High altitude fighter ...	Spitfire IX.	Naval fighter	Seafire.
Long range day and night fighter	Mosquito.	Land-based torpedo bomber	Beaufort.
All purpose fighter-bomber	FW 190.	Naval torpedo bomber	Avenger.
Long range fighter-bomber.	Mosquito.	Naval dive-bomber ...	Helldive A-25.
Long range light rec. bomber	Mosquito.	Long range naval patrol	Coronado.
Medium bomber ...	Marauder.	Transport landplane ...	York.
Heavy bomber	Lancaster.	Transport flying-boat	SE 200.

Why high-altitude bomber-rec. was chosen as a class I do not know, for there is nothing to compete with the Ju 86P; it is unique. The lists are interesting because they show that German equipment is on the whole below the standard of that of other countries.

LEADING CADET.

FIGHTER SPEEDS

Give the Rolls-Royce "R" its Due

IN their attempts to justify the speed of the modern fighter, some of your correspondents have not given the Rolls-Royce "R" engine its fair due.

Mr. Osmond states that the "R" would be much too heavy and cooling a problem in a modern fighter. In point of fact, the weight of the "R" has been given as 1,640 lb. That of the Merlin LXI was disclosed as 1,600 lb. in *Flight*, December 17th, 1942. Cooling should prove no greater a problem than presented by any other 2,600 h.p. engine. The modern ducted radiator can be designed to give negative drag at speeds in excess of 300 m.p.h.

Further on he states that the engine could not be run for long, or it would be liable to seize. This might occur as a result of detonation provoked by an unpredicted change in mixture strength or a prolonged climb, but its cause would not be purely mechanical as in the case of the over-driven new car.

Other correspondents in the same issue (February 18th) appear to be under the impression that full throttle can be used indiscriminately on a fighter. Maximum speeds always refer to the aircraft flying with its engine or engines at "all-out level," a condition limited to five minutes by the engine manufacturer. Even in war this time limit should not be exceeded without good cause. The use of "all-out level" was limited to one minute on the Mercedes-Benz 601-A and the throttle returned by clockwork.

It is not my intention to show that the "R" could be used for service, but rather that the reasons given so far do not present to the mind the differences existing between a purely racing engine and a service unit.

A comparison of the piston speed and b.m.e.p. of the "R" with the modern fighter engines gives a good impression of the liberties that were taken to get the power.

	Bore	Stroke	r.p.m.	r.h.p.	Mean piston sp.	r.m.e.p.
	ins.	ins.			ft./min.	
Rolls Royce "R" ...	6	6.6	3,200	2,600	3,500	285
Contemporary Service Engines						
Rolls Royce Kestrel V ...	5	5.5	2,900	640	2,650	135
Bristol Jupiter VIIF ...	5.75	7.5	1,950	555	2,440	130
Rolls Royce Buzzard III ...	6	6.6	2,300	925	2,525	143
1941 Service Engines						
Rolls Royce Merlin ...	5.4	6.0	3,000	1,300	3,000	210
Mercedes Benz 601 ...	5.91	6.32	2,500	1,200	2,650	180
Bristol Hercules	5.75	6.5	2,900	1,600	3,150	185
BMW 801 D	6.15	6.15	2,700	1,580	2,800	182

Piston speed is limited by the rate of wear of cylinder components and breathing capacity. The increase in service types shown here from 1930 to 1941 is due to metallurgical improvements and increased valve areas.

In the case of the "R" engine, rate of wear could be neglected and poor breathing to some extent compensated for by excessive overlap—a feature that could not be tolerated in service engines on account of the liability to backfire on starting and the reduced effective compression ratio at low-speed cruising conditions.

The b.m.e.p. was probably obtained on fuel of little higher octane value than that being produced to-day (110 octane), although, unlike the latter, it may have had a high alcohol content to render it insensitive to mixture strength and so enable the greatest possible advantage to be taken of its high latent heat to increase the density of the charge.

Apart from the purely mechanical hardships which such high b.m.e.p.s impose, and apart from the narrow margin from detonation, there is the sparking plug problem. Any plug designed to run under such arduous conditions, without becoming incandescent, and yet "hot" enough to withstand oil during warming up and taxying, is probably unobtainable even to-day. There is little doubt that the "R" was warmed up at a load and r.p.m. would prove detrimental if repeated often—it may even nave been primed with hot oil on each occasion.

Apart from the more obvious drawbacks of excessive piston speeds and b.m.e.p., there is the valve and bearing question. Also, the light weight of the engine suggests an insufficient degree of rigidity in the crankcase and other castings for continual service use. Distortion, fretting and even fractures might be expected.

Reduced to service requirements, as suggested by the table, the power of the "R" would be in the region of 1,600 b.h.p.

R. P. G. J.

TAILPLANE DIHEDRAL

Interconnection of Elevators

A DIHEDRAL angle applied to the tailplane is becoming quite a fashionable feature of modern aircraft design. The reason for this is not quite clear, and numerous text books and other works that have been consulted make no reference to the advantages to be gained from this arrangement. Prior to the war, the Airworthiness Department always recommended the interconnection of the elevators by a single spar stiff in torsion, but obviously this arrangement is not possible when a dihedral angle is provided. Would the advantage apply to all aircraft? Or is it a means to an end of correcting some vice or other that is inherent on certain aircraft only?

"INTERESTED."

INTERNATIONAL AIR POLICE FORCE

Practical Difficulties Need Discussing

THE principle seems now to be fairly widely accepted that the organisation of the post-war world must include an International Force, consisting primarily of an Air Force, without which there will be no respect for International Law and no guarantee against aggression. If the real difficulty is the political one, there are, fortunately, signs that politicians are now taking the matter in hand and realising the responsibilities which are theirs.

Mr. Anthony Eden, Sir Stafford Cripps, Mr. Herbert Morrison and others, have given the world a clear lead; there has been a ready response in the United States from Mr. Henry Wallace and Mr. Sumner Welles. There are signs, however, that many politicians are still awaiting some indication from the Government's military and air advisers that there is no insuperable practical difficulty involved. The subject needs ventilating, and the Air Ministry should give a lead.

Experience of war is showing the dominance of aircraft; this power, both military and civil, must be internationally controlled. This was pointed out by *The Times* aeronautical correspondent on February 5th, 1943, when he advocated "the complete internationalisation of air lines, all being operated under the control of a great international corporation or committee on which all the air Powers are represented."

T. DAVIES.

NEW HANDBOOKS

"FLIGHT" HANDBOOK — A GUIDE TO AERONAUTICS, AIRCRAFT ENGINES AND SUPERCHARGERS.
Third Edition. 6/- net, postage 3d.

GAS TURBINES AND JET PROPULSION FOR AIRCRAFT.
By G. Geoffrey Smith, M.B.E. 3/6 net, postage 3d.

Flight Publishing Co. Ltd., Dorset House, Stamford Street, London, S.E.1.

SERVICE AVIATION

Royal Air Force and Fleet Air Arm News and Announcements

BETWEEN SORTIES: The crew of a Boston take a hurried lunch on the desert.

A.A.F. Appointment

The Rt. Hon. Lord RIVERDALE, G.B.E., LL.D., J.P., has been appointed hon. Air Comdre. of No. 601 Sqn.

Promotions

Air Comdre. E. S. GOODWIN, C.B.E., A.F.C., to be Act. Air Vice-Marshall. February 16th, 1943.
Group Capt. (Act. Air Comdre.) H. BROADHURST, D.S.O., D.F.C., A.F.C., to be Act. Air Vice-Marshal. January 31st, 1943.

Awards

Royal Air Force

Berlin Daylight Raids

On January 30th, 1943, two forces of bombers were detailed to attack Berlin, one during the morning and the other during the afternoon. To reach the German capital necessitated a flight of more than 500 miles, mostly over heavily defended territory. Closely co-ordinated and precise timing were essential, but such was the skill exhibited that the target was reached and the attacks delivered within seconds of the specified time. That complete success was achieved, despite opposition from the ground defences, is a high tribute to the calm courage, resolution and endurance displayed by the following officers and airmen who, in various capacities, acted as members of the aircraft crews:—

DISTINGUISHED SERVICE ORDER

Sqn. Ldr. R. W. REYNOLDS, D.F.C., No. 105 Sqn.

DISTINGUISHED FLYING CROSS

Flt. Lt. J. GORDON, R.A.F.V.R., No. 105 Sqn.
F/O. R. G. HAYES, R.A.F.V.R., No. 105 Sqn.
F/O. R. C. MORRIS, R.A.F.V.R., No. 139 Sqn.
F/O. A. T. WICKHAM, R.A.F.V.R., No. 105 Sqn.
P/O. W. E. D. MAKIN, R.A.F.V.R., No. 105 Sqn.
P/O. E. B. SISMORE, R.A.F.V.R., No. 105 Sqn.

DISTINGUISHED FLYING MEDAL

Flt. Sgt. P. J. MCGEEHAN, R.N.Z.A.F., No. 139 Sqn.
Sgt. R. C. FLETCHER, No 139 Sqn.
Sgt. J. MASSEY, No. 139 Sqn.

THE KING has been graciously pleased to approve the following awards in recognition of gallantry displayed in flying operations against the enemy:—

BAR TO DISTINGUISHED SERVICE ORDER.

Grp. Capt. L. F. SINCLAIR, G.C., C.B.E., D.S.O.—This officer commands a light bomber wing which commenced operations in North Africa in November, 1942. He has led his squadrons on numerous sorties, involving low-level attacks on enemy targets in the face of heavy anti-aircraft fire and fighter opposition.

DISTINGUISHED SERVICE ORDER.

Sqn. Ldr. I. C. PATTERSON, No. 500 Sqn.—This officer has participated in many sorties, involving attacks on targets in enemy-occupied territory and in anti-submarine patrols, both in the North Sea and the Mediterranean. During a patrol in November, 1942, he observed a U-boat on the surface of the sea some distance away. Although it submerged before Sqn. Ldr. Patterson could make his attack, he continued his patrol, and, when the submarine resurfaced, he delivered a skilful attack which resulted in the destruction of the submarine. During another patrol later in the month, Sqn. Ldr. Patterson observed a submarine on the surface. He immediately attacked and seriously damaged it. The U-boat was ultimately destroyed.

Act. Sqn. Ldr. M. A. ENSOR, D.F.C., R.N.Z.A.F., No. 500 Sqn.—In November, 1942, Sqn. Ldr. Ensor and Sgt. Roe were captain and rear gunner of an aircraft employed on an anti-submarine patrol. During the flight a U-boat was observed on the surface of the sea, and Sqn. Ldr. Ensor attacked it from a height of 50 feet, causing it to blow up. The force of the explosion caused severe damage to the aircraft. Sgt. Roe, after reporting the damage to his captain, left his turret, and, with complete disregard for his own safety, commenced jettisoning all movable equipment in an effort to assist his captain to keep the aircraft airborne. Sqn. Ldr. Ensor made great efforts to retain control, but although he succeeded in climbing the damaged aircraft to 1,500 feet, one engine failed, and he was compelled to give orders for the aircraft to be abandoned.

Act. Sqn. Ldr. D. E. KINGABY, D.F.M., R.A.F.V.R., No. 122 Sqn.—Sqn. Ldr. Kingaby has taken part in more than three hundred operational missions, a large number of which have been over enemy territory. Recently he has led his wing in several engagements during which considerable losses have been inflicted on the enemy. Since being awarded a second bar to the D.F.M. he has destroyed four enemy aircraft, bringing his victories to twenty-one.

Act. Wing Cdr. P. G. JAMESON, D.F.C.—Since December, 1942, this officer has led the wing on twenty-one sorties in which thirteen enemy aircraft have been destroyed. Early in February, 1943, over France, the wing was attacked by some sixty enemy fighters. During the combat, Wing Cdr. Jameson was attacked by eight of the enemy aircraft, but he fought his way clear and eventually led the wing back to base without loss. Some days later, whilst acting as escort to a force of bombers, the wing engaged a large formation of enemy fighters and shot down seven of them, two being destroyed by Wing Cdr. Jameson. Wing Cdr. Jameson has destroyed nine enemy aircraft, two of them at night.

Wing Cdr. P. G. Jameson, D.F.C., who has been awarded the D.S.O. The official citation appears on this page. He was one of the first pilots to land a Hurricane on the deck of a carrier.

SECOND BAR TO THE DISTINGUISHED FLYING CROSS.

Wing Cdr. P. H. HUGO, D.S.O., D.F.C.—In operations in North Africa, Wing Cdr. Hugo has taken part in many sorties on which he has destroyed at least four enemy aircraft.

Sqn. Ldr. R. W. OXSPRING, D.F.C., No. 72 Sqn.—During initial operations from forward airfields in North Africa, Sqn. Ldr. Oxspring led his formation on many sorties. He destroyed one enemy aircraft, bringing his total victories to eight.

BAR TO DISTINGUISHED FLYING CROSS.

Sqn. Ldr. A. C. BARTLEY, D.F.C., No. 111 Sqn.—In the operations in North Africa, Sqn. Ldr. Bartley took part in numerous sorties, on which he destroyed two hostile aircraft, bringing his total victories to 13.

Flt. Lt. A. SMITH, D.F.C., R.A.F.V.R., No. 93 Sqn.—During the campaign in North Africa, Flt. Lt. Smith has destroyed four enemy aircraft.

DISTINGUISHED FLYING CROSS.

Sqn. Ldr. J. B. ENSOR, No. 500 Sqn.—This officer has performed much operational flying, in-

volving attacks on targets in enemy territory and anti-submarine patrols in the North Atlantic and the Mediterranean. In December he attacked a submarine and destroyed it.

Sqn. Ldr. J. H. PLAYER, No. 255 Sqn.—This officer has completed much operational flying, including operations at night. In operations in North Africa he has displayed great keenness, and has destroyed three enemy aircraft.

Sqn. Ldr. M. ROOK, A.A.F., No. 43 Sqn.—This officer has rendered valuable service during an extensive period of operational flying. He served in France and later fought in the Battle of Britain, when he destroyed two enemy aircraft. During operations in Russia he destroyed a Me 109. In November, 1942, during the assault on Algiers, this officer led his squadron on a flight to Maison Blanche airfield before it was known that the airfield had been captured. The squadron reached the airfield at an early hour, and its arrival had a most beneficial effect on the fighting and on the negotiations that were proceeding.

Flt. Lt. A. W. BARWOOD, R.A.F.V.R., No. 500 Sqn.—This officer has completed many operational sorties, including reconnaissances over the North Sea, the Atlantic and the Mediterranean. One night in June, 1942, he captained an aircraft which attacked a target in the Ruhr. During the flight his aircraft was intercepted on three separate occasions by enemy fighters. Although the bomber sustained much damage, making it difficult to control, and two of the crew were wounded, Flt. Lt. Barwood displayed great skill and determination and flew the damaged aircraft back to base. In November, 1942, he attacked a U-boat and scored a direct hit. Later in November, Flt. Lt. Barwood attacked another U-boat which had been damaged by one of his squadron's aircraft. This attack resulted in the U-boat's destruction.

Flt. Lt. J. B. COATES, R.A.F.V.R., No. 114 Sqn.—This officer has completed many sorties over France, the Low Countries and North Africa. He has at all times displayed great determination in pressing home his attacks. This was amply demonstrated in bombing attacks on enemy airfields and docks at Tunis and Bizerta.

Destroyed Four S.M. 79s

F/O. H. W. CHAMBERS, R.N.Z.A.F., No. 154 Sqn.—This officer is a skilful and determined pilot. He took part in several sorties before going to North Africa, where he has now destroyed six enemy aircraft. In November, 1942, while patrolling over a convey, F/O. Chambers intercepted five S.M. 79s attempting to attack the convoy. In the ensuing engagement he destroyed four of them. Although his aircraft sustained damage he flew it back to base.

Flt. Lt. H. G. HOLMES, No. 500 Sqn.—This officer has completed a large number of hours flying on patrols and reconnaissances over the North Sea, the Atlantic and the Mediterranean. In November, 1942, he delivered five attacks on enemy submarines, resulting in the certain destruction of one. In December, 1942, he intercepted an Italian flying boat and shot it down into the sea.

Flt. Lt. A. LAMMER, R.A.F.V.R., No. 255 Sqn.—As observer Flt. Lt. Lammer has rendered valuable service. His aircraft has destroyed four enemy aircraft.

Flt. Lt. I. G. STEWART, No. 225 Sqn.—In North Africa, Flt. Lt. Stewart has completed numerous reconnaissance and bombing sorties in support of the Army. In the course of these operations, superior forces of enemy fighters were encountered, but Flt. Lt. Stewart, displaying great skill, successfully returned to base with valuable information.

F/O. D. G. S. R. COX, R.A.F.V.R., No. 72 Sqn.—This officer has participated in many sorties, including attacks on transport troops and airfields. F/O. Cox has destroyed six enemy aircraft, three of them in North Africa.

F/O. K. L. WAUD, R.A.V.R., No. 81 Sqn.—This officer has completed a very large number of sorties, including a number in Russia, where he flew with distinction. In the campaign in North Africa he has performed much excellent work. F/O. Waud has destroyed four enemy aircraft.

F/O. M. J. GLOSTER, R.A.F.V.R., No. 255 Sqn.
P/O. J. F. OSWALD, R.A.F.V.R., No. 255 Sqn.

As pilot and observer respectively, these officers have flown together in operations in North Africa. One night in December, 1942, F/O. Gloster, ably supported by his observer, destroyed three enemy aircraft, all of them within an hour.

P/O. J. W. BARLING, R.A.F.V.R., No. 233 Sqn.—This officer has participated in a large number of sorties. In November, 1942, while off escort duties, he intercepted a Ju. 88 and forced it to jettison its bombs. Some days later he attacked and destroyed a U-boat.

P/O. N. C. ECKERSLEY, R.A.F.V.R., No. 18 Sqn.—This officer has taken part in numerous sorties. In December, 1942, he was the rear gunner of one of a formation of aircraft detailed to attack an enemy airfield. During the flight the formation was attacked by fifty enemy fighters. In the ensuing engagement, P/O. Eckersley destroyed one and damaged three enemy aircraft. He received severe injuries, while his aircraft was badly damaged and caught fire, but he maintained a steady fire at the attackers and enabled his pilot to effect a safe landing.

P/O. H. E. FENWICK, R.C.A.F., No. 81 Sqn.—P/O. Fenwick has participated in a large number of sorties. He has always displayed great determination to achieve success and has destroyed four enemy aircraft.

F/O. J. H. ETHERTON, R.A.F.V.R., No. 89 Sqn.—One night in November, 1942, F/O. Etherton and Sgt. Gibbs were pilot and observer of an aircraft engaged on a patrol in North Africa. Whilst attempting to land at an airfield, after completing their mission, one engine failed, causing the aircraft to crash. Despite this, F/O. Etherton and his observer took off in another aircraft for a second patrol. Owing to engine trouble, F/O. Etherton was compelled to return to the airfield but after his aircraft had been serviced, he again took off and, in the course of the patrol, destroyed a He 111. In a short period F/O. Etherton destroyed six enemy aircraft. Sgt. Gibbs contributed materially to the successes achieved.

P/O. W. W. BOYLSON, R.A.A.F., No. 7 Sqn.—This officer has completed a large number of operational sorties in heavy bomber aircraft and throughout has displayed a high standard of efficiency and courage. He is an excellent operational pilot who has repeatedly accomplished his mission successfully, pressing home his attacks on targets in Germany and Italy in the face of heavy opposition.

P/O. J. R. CASSELS, R.A.F.V.R., No. 106 Sqn.—As captain of aircraft P/O. Cassels has taken part in many operational sorties against targets in the Ruhr, enemy naval ports and industrial centres in Italy. He also participated in the "1,000-bomber raids" and has made several mining sorties in the Baltic. One night in July, 1942, he was detailed for an attack on Saarbrucken. As the target was completely obscured by cloud, he descended to 4,000 feet before releasing his bombs. On the return journey his aircraft was attacked separately by five fighters but, displaying great coolness, he evaded two of the attackers, drove off another two and destroyed the fifth.

P/O. L. JONES, No. 156 Sqn.—Throughout his numerous operational sorties, P/O. Jones has proved himself to possess technical capabilities of the highest order. While flying as wireless operator he has made himself thoroughly familiar with the duties of all the members of the crew, simultaneously exhibiting exceptional skill in his own work.

P/O. L. R. B. LOVING, R.C.A.F., No. 149 Sqn.—One night in September, 1942, P/O. Loving was detailed for a low level attack on the submarine shipbuilding yards near Bremen. In a determined effort to locate and bomb this target, which was obscured by heavy cloud, he descended to a height of only 800 feet. He was immediately engaged by searchlights and the ground defences. His aircraft was twice hit by anti-aircraft fire and P/O. Loving was forced to dive down to 50 feet to evade the fire attack. His gunners succeeded in extinguishing two searchlights and from this low altitude, in the glare of other searchlights, he released his bombs.

P/O. W. J. SIBBALD, R.C.A.F., No. 101 Sqn.—This officer, throughout a very successful tour of duty, has displayed exceptional ability as a wireless operator. He is a cool and reliable member of aircraft crew whose sense of discipline and responsibility has invariably inspired confidence in his comrades. On several occasions, he has successfully dealt with most difficult situations.

W/O. G. D. GAMBLE, R.A.F.V.R., No. 220 Sqn.—Three times within recent weeks W/O. Gamble, while captain of an aircraft, has been largely responsible for saving a total of 40 lives from the Atlantic. On each occasion he has remained at the scene of rescue to the limit of the fuel capacity of the aircraft. Throughout his two years with the squadron this officer has maintained a very high standard of conduct.

W/O. E. M. GREAVES, R.N.Z.A.F., No. 156 Sqn.—W/O. Greaves has taken part in many operational flights with exceptional enthusiasm and devotion to duty. He has invariably displayed coolness and courage, together with a great desire to accomplish his allotted tasks efficiently.

W/O. C. A. HOWARD, No. 138 Sqn.—W/O. Howard is a navigator of outstanding ability. Since February, 1942, he has taken part in many operational flights.

DISTINGUISHED FLYING MEDAL

Sgt. H. J. ROE, No. 500 Sqn.—For citation see Act. Sqn. Ldr. M. A. ENSOR, D.F.C.

Sgt. N. L. GIBBS, No. 89 Sqn.—For citation see F/O. ETHERTON.

Flt. Sgt. R. D. S. FOX, No. 114 Sqn.—As wireless operator/air gunner, this airman has participated in many operational missions. He has operated from bases in England, Malta, and North Africa.

Flt. Sgt. J. BARTLEY, No. 18 Sqn.—As wireless operator/air gunner, Flt. Sgt. Bartley has taken part in numerous sorties. His exemplary conduct in the face of the enemy has set a praiseworthy example. By his untiring efforts Flt. Sgt. Bartley has rendered excellent service in training fellow wireless operators.

Sgt. J. R. MALLINSON, No. 242 Sqn (since reported missing).—In the campaign in North Africa this airman has destroyed four enemy aircraft. In November, 1942, he destroyed two of a formation of five Ju. 88's which attempted to attack an Allied airfield.

Sgt. S. P. MOSTON, No. 81 Sqn.—This airman is a first-class pilot whose keenness has set a fine example. In operations in North Africa, Sgt. Moston has destroyed at least four enemy aircraft.

THE KING has been graciously pleased to approve the following award:—

M.B.E. (MIL.)

F/O. C. S. MASON, R.A.A.F., No. 76 (R.A.A.F.) Sqn.

B.E.M. (MIL.)

Pte. H. SUMMERS, V.D.C., Queensland.

On March 31st, 1942, in fog conditions an Aircobra aircraft struck the top of a tree in a dispersal area, burst into flames and continued for approximately 150 yards before hitting the ground, rolling down a slope for a further hundred yards as a complete wreck. F/O. Mason followed the direction of the aircraft after it had collided with the tree and instructed an airman to telephone immediately for the ambulance and fire tender and to despatch the dispersal point fire extinguishers to the scene of the accident. Pte. Summers joined F/O. Mason at the scene of the crash. On first viewing the wreckage F/O. Mason thought that the pilot had been killed outright, but quickly detected movements in the cockpit and, despite the fact that portions of the wreckage were burning fiercely, and ammunition was discharging from six magazines, he and his companion dashed in to rescue the pilot, who was unconscious and jammed in the compartment by bent sections of the cockpit. Cannon shell was also in the magazines and the possibility of its discharging as the flames and heat increased was ever present. Assisted by his companion, F/O.

Marshal of the Royal Air Force, Viscount Trenchard, G.C.B., G.C.V.O., D.S.O., inspecting squadrons of the R.A.F. Regiment at a northern training depot.

Mason unfastened the safety belt. The locking device for the belt was a type which neither had seen before. Wreckage had to be pulled away from the pilot's left leg and right arm before he could be extricated. Difficulty was experienced owing to the absence of any device with which to prise apart the obstructions holding the pilot in the cockpit. F/O. Mason worked with speed and precision, and was successful in releasing both limbs. Nevertheless, during the process, it was necessary in the course of removing the crumpled rudder bar from the pilot's left foot to move still closer to the flames, and in so doing F/O. Mason was burnt on the left arm. Finally, before the pilot could be dragged clear, it was necessary to untangle or unlock the parachute harness. The latter process proved difficult, and as the flames continued to spread it was clear that speed was now essential if the pilot's life was to be saved. F/O. Mason, therefore, dragged the tangled harness clear of the burning aircraft while Pte. Summers held the pilot, who was then carried clear and conveyed to the station hospital by ambulance.

L.A/C. A. J. H. HALE.

L.A/C. S. A. STEPTO.—L.A/C.s Hale and Stepto have been employed in an airfield clearance party at Malta for several months. They have both performed their duties with the greatest zeal, often displaying complete disregard for their personal safety when clearing runways while heavy raids on the airfields have been in progress.

THE KING has been graciously pleased to approve the following award in recognition of gallant and distinguished service:—

DISTINGUISHED CONDUCT MEDAL.

Sgt. D. D. W. NABARRO.

Roll of Honour

Casualty Communiqué No. 208.

THE Air Ministry regrets to announce the following casualties on various dates. The next of kin have been informed. "Casualties" in action" are due to flying operations against the enemy; "on active service" includes ground casualties due to enemy action, non-operational flying casualties, fatal accidents and natural deaths.

Royal Air Force

KILLED IN ACTION.—Sgt. P. L. Bailey; Sgt. W. G. Clark; Sgt. B. H. Coulter; Sgt. C. T. Eaton; Sgt. R. Evans; P/O. G. A. Glibbery; Sgt. H. Pendleton; Sgt. J. F. Roberts; Sgt. J. T. Williams.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. R. S. Bell; Sgt. G. S. Fox; W/O. S. M. Green; Sgt. J. McCormack; P/O B. W. Main; Sgt. K. J. A. Manley.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. C. R. Campbell; Sgt. E. Chadwick; Sgt. T. Cudworth; Sgt. R. I. Coffin; P/O. D. C. Evans; Sgt. S. H. Healop; Sgt. L. Johnson; Sgt. T. J. Kehoe; Sgt. J. McK. Kennedy; Sgt. A. G. Leyland; Sgt. D. H. MacDonald; Sgt. T. P. Morgan; Sgt. P. D. Powell; F/O. R. M. Shattock; Sgt. S. E. Springham; Sgt. M. Sweeney; Sgt. R. W. Watson.

WOUNDED OR INJURED IN ACTION.—Sgt. A. E. Nicholls; Sgt. H. S. Osborne; Sgt. J. K. J. Rostant; Sgt. A. H. Stodhart.

MISSING, BELIEVED KILLED IN ACTION.—Sgt. J. M. B. Albrecht; Sgt. G. S. Anderson; P/O. J. L. Armitage, D.F.C.; Sgt. E. L. R. Brown; Sgt. C. Caloert; Act. Sqn. Ldr. J. E. Houlston, A.F.C.; Sgt. R. F. H. Kenyon; Sgt. F. V. Lamb; Sgt. R. W. Lane; Sgt. J. Law; Sgt. T. McCallum; Flt. Sgt. C. C. McColl; Sgt. R. McL. Paterson; F/O. D. E. Pike; Sgt G. A. Robson; Sgt. F. N. Skinner; Sgt. J. W. Taylor; Sqn. Ldr. J. G. G. Walkington; Sgt. M. R. Wallis; Sgt. E. J. D. Watt.

MISSING.—Flt. Sgt. J. F. C. Ballantyne; Flt. Lt. F. B. Bassett; A/C.2 F. C. Bell; Sgt. J. Bishop; Sgt. L. Booth; Sgt. N. R. Brunt; P/O. E. T. Bugden; Sgt. A. F. Copplestone; Flt. Sgt. C. A. Cowley; F/O. R. M. Cumming; Sgt. J. G. Dawson; F/O. G. H. Dean; Sgt. H. Dyke; P/O. M. O. Eldrid; Sgt. T. G. Emery; Sgt. C. A. Farrimond; Sgt. H. R. Feast; Flt. Sgt. W. E. Foot; P/O. E. Franklin; Flt. Sgt. W. J. Ginger; Sgt. H. W. Goodman; P/O. W. Goulding; Cpl. E. I. Hall; Sgt. M. G. B. Hall; Sgt. A. M. Hamilton; Flt. Sgt. J. G. Hebden; Sgt. K. V. Hill; P/O. A. Jickling; Flt. Sgt. D. G. Kelly; Sgt. A. J. C. Lavers; P/O. G. J. Lawson; Sgt. H. G. Lines; Sgt. J. G. Liney; Sgt. F. Logan; Sgt. W. H. McCammond; W/O. H. McColl; F/O. A. M. MacLay; Sgt. A. W. McMorrine; Sgt. J. S. Macks; P/O. C. D. Marshall; Sgt. L. O. Molloy; Sgt. W. C. Morgan; Sgt. H. Newell; Sgt. J. R. O'Meara; F/O. T. L. Parker; Flt. Lt. W. Parkinson P/O. J. W. H. Pavitt; Sgt. C. H. Pooley; Wing Cdr. C. V. J. Pratt; Sgt. F. Price; P/O. W. F. Rains; P/O. C. A. Rodgers; Cpl. J. W. Sherwin; Flt. Sgt. R. G. Stolz-Page; Sgt. C. M. Taylor; Sgt. W. A. Thompson; Sgt. C. F. Thornton; P/O. R. Wallace; Sgt. A. J. P. Watts; Flt. Sgt. R. B. Whitcombe; Sgt. T. T. Wilkinson; Flt. Sgt. G. E. Woodcock.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—Sgt. F. H. Aldous; Sgt. E. J. Harrild.

KILLED ON ACTIVE SERVICE.—Sgt. D. I. M. Allan; Sgt. D. S. Allen; Sgt. C. F. Bonorino; Sgt. J. W. Butterfield; Sgt. R. Craven; Cpl. L. Duncan; Sgt. J. W. Evans; Flt. Lt. E. G. Ford; Act. Cpl. D. Gardiner; Sgt. G. A. Griffiths; L.A/C. H. N. Hall; Sgt. L. H. Harper; Sgt. R. Harrison; Sgt. B. G. Hawkes, Sgt. H. G. Jenkins; Flt. Sgt. J. C. MacAulay; Sgt. L. P. McGuire; Sgt. R. J. Marshall; Sgt. S. E. Pike; Sgt. J. Proud; P/O. I. P. Spence; Sgt. F. H. Steward; A/C.1 L. Sutcliffe; Sgt. S. Weaver.

WOUNDED OR INJURED ON ACTIVE SERVICE.—A/C.2 A. W. Hinton; A/C.2 A. S. Lucas; L.A/C. D. Marshall; F/O. E. A. Martin; A/C.2 R. B. Oswald; Sgt. R. F. Pretty.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—Sgt. C. L. Dent; Sgt. R. E. Edgson; L.A/C. E. Reid; Sgt. E. L. Williams.

DIED ON ACTIVE SERVICE.—A/C.1 T. H. Baird; L.A/C. J. Davies; Cpl. R. E. Dyball; A/C.1 G. Elrick; A/C.1 J. E. M. Fry; Flt. Lt. C. E. Godfrey; F/O G. A. Haig; Act. Flt. Lt. J. C. Hardman; A/C.2 K. Kent; L.A/C. J. W. Mahon; A/C 2 W. E. Pritchard; Sgt. E. C. Purvis; A/C.1 D. G. Richards; A/C.2 J. Spence; Cpl. W. McG Stag; A/C.1 R. Turner; A/C.1 T. Ward.

Royal Australian Air Force

KILLED IN ACTION.—Flt. Sgt. R. H. Middleton, V.C.

MISSING.—Flt. Sgt. R. F. Hammond, D.F.M.; Flt. Sgt. P. J. O. Mueller; Sgt. J. W. E. Wilson.

KILLED ON ACTIVE SERVICE.—Sgt. S. R. Barling; Sgt. J. A. Barrett-Lennard; Sgt. L. K. Day; Sgt. R. E. Mitchell; Sgt. J. B. Muir; Sgt. R. H. Sankey.

DIED ON ACTIVE SERVICE.—Cpl. D. A. Riley

Royal Canadian Air Force

KILLED IN ACTION.—Sgt. H. T. Cunningham; P/O. K. E. Warner.

WOUNDED OR INJURED IN ACTION.—Sgt. W. W. Bigoray; Flt. Sgt. G. C. Bradley; Flt. Sgt. F. P. Grant; Flt. Sgt. E. T. Vachon.

MISSING, BELIEVED KILLED IN ACTION.—Sgt. W. O. Anderson; Sgt. D. H. Chapman; P/O A. D. Chidderton; Sgt. W. D. Deatherage; Sgt. J. Gardner; Flt. Sgt. J. C. Jackes; Sgt. J. C. Kerr; F/O. S. L. McBurney; Sgt. J. R. Millar; Sgt. H. Morrissy; Sgt. B. H. Nickel; Flt. Sgt. L. E. Thorneycroft; Sgt. R. D. Wiberg.

MISSING.—P/O. J. Ash; Sgt. H. M. Batters; Flt. Sgt. J. E. Bunt; Sgt. W. C. Cameron; P/O. A. B. Campbell; F/O. R. L. Coulter; Flt. Sgt. R. S. Donald; P/O. J. J. Earls; P/O. A. R. Haines; Sgt. R. B. Honeycombe; Sgt. J. N. C. Hornidge; Flt. Sgt. A. M. H. Johnson; Sgt. G. J. D. Kerswill; Flt. Sgt. R. MacLean; Flt. Sgt. A. M. W. McCrae; P/O. H. E. McGraw; Flt. Sgt. H. MacD. Martin; P/O. G. C. Silver; Sgt. E. Simbalist; Sgt. S. W. Sotkowy; Flt. Sgt. J. C. Swarbrick; Sgt. C. C. Trudell; Sgt. G. H. Waters; Sgt. J. V. Welsh; P/O. J. D. Woodman.

KILLED ON ACTIVE SERVICE.—Sgt. D. C. Cameron; Sgt. B. H. H. Hanan; Flt. Sgt. N. Taylor.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Flt. Sgt. D. J. Phillips.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—Flt. Lt. K. L. Johnston.

Royal New Zealand Air Force

KILLED IN ACTION.—Sgt. J. E. Albertson.

WOUNDED OR INJURED IN ACTION.—Sgt. W. H. Thompson.

MISSING, BELIEVED KILLED IN ACTION.—Sgt. F. J. Franklin.

MISSING.—Sgt. J. F. Garland; Sgt. S. Holmes; L.A/C. W. W. Johnson; Sgt. D. S. Proctor; Sgt. A. Scott; Flt. Sgt. L. C. Shepherd; Sgt. L. E. Tempest.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—Sgt. B. Moore.

KILLED ON ACTIVE SERVICE.—Flt. Lt. R. I. McChesney; Flt. Lt. A. C. McKinnon; F/O R. J. B. Peacocke.

South African Air Force

KILLED IN ACTION.—Capt. W. R. Thomson.

WOUNDED OR INJURED IN ACTION.—Lt. A. H. R. George.

KILLED ON ACTIVE SERVICE.—2/Lt. T. D. Inglis.

Casualty Communique No. 209

Royal Air Force

KILLED IN ACTION.—Sgt. A. C. Ashton; Sgt. E. Aspell; Sgt. A. J. Easton; Flt. Sgt. A. C. Elger; P/O. V. N. Giri; Sgt. R. I. Gunter; Sgt. C. Harmston; Sgt. E. Jackson; Sgt. R. Semley; Sgt. R. C. Simmons; Sgt. A. E. Watts; F/O T. A. Young.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. B. W. Johnson; Sgt. J. Potter; Act. Sqn. Ldr. W. M. Protheroe; Sgt. J. P. Shipton; P/O. H. A. Shortt; Sgt. G. M. C. Turner; Sgt. H. E. Vosper.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. V. E. Egan; P/O. M. L. Field; Sgt. C. L. Hand; Sgt. P. Heppenstall; Sgt. N. C. Hutson; Sgt. E. A. Kirk; Sgt. D. J. Meikle; Sgt. C. Moynes; Sgt. C. Pottas; Sgt. K. Robinson.

WOUNDED OR INJURED IN ACTION.—Flt. Sgt. H. C. Highet; F/O. J. B. Rigby.

MISSING, BELIEVED KILLED IN ACTION.—Sgt. H. Bate; Flt. Sgt. L. J. W. Beckman; Sgt. G. J. Bentley; Sgt. R. A. F. Bignell; Sgt. F. W. Brogden; Sgt. L. Byrne; Act. Flt. Lt. A. J. Child; Flt. Sgt. S. Cooper; Sgt. C. A. Davey; Sgt. G. J. Dean; P/O. I. G. A. Faulk; Sgt. H. G. Ford; Sgt. T. J. Fraser; Sgt. R. W. Game; F/O. H. Gilleland; F/O. N. E. Goldsmith, D.F.C.; Sgt. D. C. Gosden; Sgt. W. P. Gregory; Sgt. J. Hill;

Air Comdre. A. H. Wann, now doing air staff duties, is one of the few survivors of the airship R 38 which broke up in the air over the Humber during trials in 1921. He commanded a Fairey Battle Squadron in France in 1939.

Sgt. P. C. Hind; Sgt. A. Howison; Sgt. J. W. C. Kidd; Sgt. G. H. Kitchen; Sgt. R. C. Lamerton; P/O. R. L. Leith-Hay-Clark; P/O. J. W. Lynes; Sgt. M. MacLellan; Act. Wing Cdr. J. H. Marks, D.S.O., D.F.C.; Sgt. R. Marsh; Sgt. A. T. Milton; Sgt. F. W. Morris; Sgt. P. Moulton; Sgt. M. F. Natham; Sgt. G. Nicholls; Sgt. W. J. Nobbs; Sgt. R. L. Ploskin; Sgt. F. K. A. Seals; Flt. Lt. K. S. Smith; P/O. J. S. Smyth; Sgt. A. Staff; Sgt. J. H. Stirk; Sgt. H. B. Stokes; Sgt. J. Sykes; Flt. Sgt. W. C. Turner; Sgt. E. F. Turton; Sgt. J. W. Tyreman; Sgt. G. A. Wainwright; Sgt. J. R. Walker; Sgt. S. G. Walton; Sgt. R. G. Ware; Sgt. S. J. Wick; Sgt. D. M. Wilson; Sgt. G. C. Wing.

MISSING.—Sgt. E. Airey; Sgt. F. Barratt; Flt. Sgt. T. Bennett; Sgt. T. Bentham; Sgt. H. Bispham; P/O. E. B. Bowen; Flt. Sgt. R. G. Brett; Sgt. R. C. Brinkley; Flt. Sgt. J. Brister; Sgt. S. W. Brooke-Norris; Sgt. E. A. Brown; Squ. Ldr. G. A. Brown; P/O. P. M. Burton; L.A/C. P. Cashmore; Flt. Lt. A. G. Donahue, D.F.C.; Flt. Sgt. K. E. Edwards; Sgt. R. O. Eynon; P/O. J. P. Fraser; Sgt. H. W. Frost; Sgt. P. J. Gillan; Sgt. D. G. Guy; Flt. Lt. E. T. Halley; F/O. W. M. Henderson; Sgt. A. Jeffreys; Sgt. G. W. Lewis; P/O. J. G. McCauley; F/O. P. B. Martell; Sgt. A. Mottram P/O. W. A. Milne; P/O. J. Phipp; Sgt. C. J. Pope; Sgt. S. H. Porteous; Flt. Sgt. P. E. Poulson; Sgt. D. N. Powell; Sgt. D. F. Reeve; Flt. Sgt. R. L. Romig; P/O. J. K. P. Rumbold; Sgt. R. A. H. Russ; P/O. G. Smith; Flt. Sgt. J. L. Smith; P/O. D. M. H. Taylor; P/O. A. H. Vernon; Sgt. K. O. White; Sgt. E. F. Willson; Act. Sqn. Ldr. R. S. Woodward, D.F.C.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—A/C.1 J. S. Holt; Sgt. N. E. Spencelev; L.A/C. R. J. Wright.

KILLED ON ACTIVE SERVICE.—P/O. P. R. Allen; Sgt. G. K. Bardwell; Sgt. H. Bell; Sgt. J. D. Bradley; Sgt. W. K. Charlton; Sgt. T. Collingwood; F/O. D. A. Crowther; Sgt. R. S. Doore; Sgt. R. A. Duffield; Sgt. W. A. Edwards; Sgt. J. Feord; Act. Sgt. D. H. Foulds; Sgt. F. J. Fowler; Sgt. G. Gardner; L.A/C. K. B. Hunter; Sgt. O. F. Hunter; L.A/C. G. Imber; Sgt. J. O. Irving; Sgt. E. C. King; Sgt. J. R. Longstaff; Sgt. N. K. Millard; Sgt. P. P. Mortimer; Sgt. R. B. Neilson; Sgt. J. D. Osborne; Sgt. J. Patterson; Sgt. W. Precey; Sgt. C. G. Randolph; F/O. W. McK. Read; P/O. J. Sawyer; Sgt. C. R. F. Shackell; P/O. F. G. Shell; Sgt. H. R. Smith; P/O. H. R. Snary; Sgt. M. Stringer; Sgt. W. H. Taylor; L.A/C. S. H. Tyne; Sgt. D. S. Waltho; L.A/C. W. T. Whiting.

WOUNDED OR INJURED ON ACTIVE SERVICE.—L.A/C. R. W. Badkin; F/O. L. C. E. Devigne; F/O. E. J. F. Fox; Sgt. V. C. Parker; Act. F/O. G. H. Poet; Flt. Sgt. R. W. Shallis.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—Sgt. D. R. Loyd; L.A/C. J. J. Sims.

DIED ON ACTIVE SERVICE.—Cpl. F. Davies; Sgt. B. H. Evans; Sgt. F. Hepworth; A/C.1 L. King; Cpl. W. H. Romalla; A/C.2 R. F. Sawney; A/C 2 R. K. Tams; Cpl. T. Watson.

Women's Auxiliary Air Force

DIED ON ACTIVE SERVICE.—S/O. V. Rowson A/CW.2 R. Woodall.

SERVICE AVIATION

Royal Australian Air Force

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. G. W. Fisher; Sgt. C. Gammie; Act. F/O. G. T. Heard; P/O. R. H. Nitschke.

WOUNDED OR INJURED IN ACTION.—P/O. W. R. Berriman.

MISSING, BELIEVED KILLED IN ACTION.—Sgt. P. Cockington; Sgt. T. E. Exell; Sgt. R. J. Haire; Sgt. J. M. Jeffries; Act. Flt. Lt. W. Martin, D.F.C.; Sgt. R. I. Robb.

MISSING.—Sgt. C. E. Bayliss; Sgt. H. F. Ford; Act. Flt. Lt. J. Marchant, D.F.C.; Act. Flt. Lt. F. C. Oldmeadow.

KILLED ON ACTIVE SERVICE.—P/O. F. J. Madden; Sgt. H. M. Sims; Sgt. R. M. Weolley.

Royal Canadian Air Force

KILLED IN ACTION.—Flt. Sgt. G. T. Campbell; Sgt. T. Baillie; Sgt. J. C. Carswell; Sgt. D. H. M. Jacques; Sgt. W. C. McBean; Flt. Sgt. G. D. McCready; Sgt. W. H. Tape; Sgt. B. A. Rogers.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Flt. Lt. R. M. Lawrence/

WOUNDED OR INJURED IN ACTION.—Sgt. K. E. McKay.

MISSING, BELIEVED KILLED IN ACTION.—P/O. J. H. J. Cholette; P/O. R. J. Gunn, Sgt. E. I. Johnston; P/O. P. A. G. Martel; Flt. Sgt. J. P. A. Raymond; Flt. Sgt. C. W. H. Roy.

MISSING.—Sgt. R. C. Daoust; Flt. Sgt. G. McL. Dunn; Sgt. T. I. M. Edwards; Flt. Lt. J. L. Ellam; Sgt. W. E. Foster; W/O. J. L. Gaucher; Sgt. L. V. Johnston; Sgt. J. H. Love; Flt. Sgt. L. E. Moriarty; F/O. J. E. O'Grady; Sgt. D. R. Smith; Sgt. S. M. Thomas; F/O. C. W. Woodward.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—Sgt. J. G. Dukick; Sgt. D. L. Erickson; Sgt. L. A. Hoskins.

KILLED ON ACTIVE SERVICE.—Sgt. G. T. Coughbrough; Sgt. B. D. Gregory; Sgt. E. C. McPhee.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Sgt. E. T. Smith.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—Sgt. D. L. Evans.

Royal New Zealand Air Force

KILLED IN ACTION.—Sgt. K. E. Smith.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—P/O. A. L. Ellis.

WOUNDED OR INJURED IN ACTION.—Flt. Sgt. L. B. Wallace.

MISSING, BELIEVED KILLED IN ACTION.—F/O. D. R. Bannerman.

MISSING.—F/O. E. W. Barr; Sgt. N. Bruce; W/O. F. V. Watkins.

KILLED ON ACTIVE SERVICE.—Sgt. T. I. Manson; P/O. E. G. Wagstaff.

South African Air Force

KILLED ON ACTIVE SERVICE.—Lt. Tolmer.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—Lt. R. G. Harrison.

Casualty Communiqué No. 210

Royal Air Force

KILLED IN ACTION.—Sgt. J. F. Bootle; Sgt. R. A. Brant; F/O. J. Lowe; Sgt. J. H. Murray; Act. P/O. W. T. Pickles; Sgt. J. C. Stirrat; Sgt. R. Veitch; Sgt. J. Warrender.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. E. R. H. Anderson; Sgt. M. Bates; Sgt. J. S. Beauchamp; Act. Flt. Lt. E. M. Bury; Sgt. R. Colvin; Sgt. T. Crilly; Flt. Sgt. E. M. Ford; Sgt. R. J. Fraser; Sgt. J. S. Gething; Sgt. E. Harrison; Sgt. P. J. L. Hoyle; Sgt. G. J. Laing; Sgt. H. N. Wanostrocht.

WOUNDED OR INJURED IN ACTION.—F/O. D. McHarrie; Sgt. J. Russell; Sgt. D. Taylor.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—Act. Sqn. Ldr. A. E. Hill, D.S.O., D.F.C.

MISSING, BELIEVED KILLED IN ACTION.—Sgt. J. Callan; Sgt. A. M. T. Carpenter; Sgt. R. P. Crisp; Sgt. G. R. Dickenson; Sgt. P. L. Donald; Sgt F. J. Fisher; Sgt. A. C. Foxley; Sgt. J. L. Greening; Sgt. D. H. Harries; Sgt. G. T. Hawkins; Flt. Sgt. J. R. Hughes; Flt. Sgt. R. S. S. James; Sgt. E. Lewis; Sgt. E. C. Mowforth; F/O. M. A. Nias; Sgt. L. G. Powell; Sgt. T. M. Richings; Sgt. A. D. Rowsell; Sgt. W. E. Ryan; Wing Cdr. F. C. Seavill; Sgt. P. C. Shipman; Sgt. E. J. Smith; Sgt. B. H. Thomas; Sgt. F. Trimmer; Sgt. G. B. Wilkinson; Sgt. W. O. H. Williams; Sgt. J. C. Wood.

MISSING.—Sgt. A. L. Abraham; P/O. P. R. Ackerley; Sgt. L. C. Andrews; Sgt. D. W. Archibald; Sgt. J. H. Baker; Sgt. R. A. Barnes; Sgt. G. Beckett; F/O. D. F. H. Biggane, D.F.C.; F/O. R. A. Bowles; Sgt. D. Brierly; Sgt. J. D. Brinkhurst; Sgt. E. Brown; Flt. Sgt. A. M. Camplin; Sgt. A. M. Coakey; Sgt. R. Cook; Flt. Lt. O. G. Cooke, D.F.C., D.F.M.; P/O. J. A. Denning; Sgt. J. A. Drain; F/O. H. Duro; Wing Cdr. P. H. Dutton; Sgt. J. R. Ellam; Sgt. E. V. Evans; Flt. Sgt. E. Fenwicke-Clennell; Sgt F. Gilder; P/O. B. C. Goodwin, D.F.M.; Sgt. J. S. Greaves; Flt. Sgt. V. Greenwood; Flt. Sgt. M. H. Hale; P/O. A. Hampshire; Sgt. L. E. Herbert; Flt. Sgt. R. C. Hovers; Sgt. W. Imrie; Sgt. S. J. Isaac; Sgt. G. W. Jones; Flt. Sgt. B. G. Lough, D.F.M.; P/O. R. W. McCarthy, D.F.M.; P/O. S. C. McLellan; Sgt. K. R. McLeod; F/O. L. G. McNamara; Sgt. C. A. Maw; Sgt. T. Mellors; P/O. J. A. W. Moffat, D.F.C.; Sgt. F. Morrell; P/O. A. E. Mulholland; Sqn. Ldr. R. N. Peace, D.F.C.; Sgt. M. C. Pearman; Sgt. H. C. Pont; Sgt. C. R. Ray; F/O. D. R. Redbourne; W/O. A. J. Reid; Sgt. M. Reynolds; Sgt. H. A. Roberts; Sgt. P. G. E. Ross; Sgt. A. B. P. Rumsey; Act. Flt. Lt. N. H. Shepherd, D.F.M.; F/O. E. A. U. Smith; Sgt. J. J. Smith; Flt. Sgt. W. J. A. Spriggs; Sgt. C. N. Stanbury; Sgt. P. J. Stokes; Flt. Sgt. A. Taylor; Sgt. N. Van Gelder; Sgt. E. J. F. Vick; Sgt. J. E. N. Warner; Flt. Sgt. J. P. Warren; Sgt. J. H. Watling; P/O. J. Williams; P/O. J. D. Willson.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—Flt. Sgt. J. Horsley; Sgt. R. A. Maun; Sqn. Ldr. H. B. Mould.

KILLED ON ACTIVE SERVICE.—Sqn. Ldr. D. E. G. Ashill; Sgt. N. A. Bastick; A/C.2 J. E. G. Beaumont; Sgt. K. J. Bowler; Sgt. A. D. Boyle; A/C.2 G. Broadhurst; F/O. J. G. Byrne; Sgt. J. Casey; Cpl. H. C. Gale; Flt. Sgt. D. C. Godfrey; Sgt. A. V. Green; Sgt. W. D. P. Hindle; F/O. S. T. Hollick; L.A/C. J. D. Hunt; P/O. J. S. Hutton; Sgt. F. C. Jackson; F/O. P. Jones; L.A/C. W. McLean; P/O. J. MacLennan Flt. Sgt. W. McMillan; L.A/C. L. H. Nicholson; Flt. Sgt. J. Orr; Sgt. J. W. G. P. Lettington; Sgt. G. Parker; Sgt. R. G. Pearson; A/C.1 J. H. Pedrick; P/O. C. A. Saunders; L.A/C. W. H. Valentine; Sgt. G. H. Walsh; L.A/C. W. J. Watters.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Sgt. H. Boardman; Sgt. C. Flint; Sgt. L. Hammond; Sgt. H. Unsworth.

WOUNDED OR INJURED ON ACTIVE SERVICE.—L.A/C. F. C. Cook; Cpl. A. G. Dixon; L.A/C. H. W. Gardner; Sqn. Ldr. I. P. Grant, D.F.C., A.F.C.; Cpl. J. G. Hopkins; P/O. M. B. Hull; L.A/C. D. W. King; Flt. Lt. E. G. L. Menkes; L.A/C. D. A. Miller; A/C.1 R. Millership; L.A/C. J. M. Palmer; Sgt. R. G. Saunders; L.A/C. D. J. Worsnup.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—A/C.2 C. L. Heaton; Act. Flt. Lt. C. B. Ordish.

DIED ON ACTIVE SERVICE.—L.A/C. E. T. J. Baker; A/C.2 J. F. Damant; A/C.2 J. W. Deans; A/C.1 J. S. Doherty; A/C.1 J. W. Good; A/C.1 R. Henry; A/C.1 W. Kirk; Cpl. F. Leckenby; Sgt. J. F. Lomax; A/C.1 A. McLean; L.A/C. M. M. Marks; L.A/C. A. Martin; A/C.1 C. H. Maxwell; L.A/C. W. Morton; Cpl. L. T. Parker; Act. Sqn. Ldr. V. W. L. Stanion, D.F.C.; Sgt. J. H. Sweeney; A/C.2 A. G. Taylor; Cpl. C. A. Thripp; A/C.2 J. H. Wall; L.A/C. D. Walley; A/C.1 I. Williams.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—P/O. P. N. Kingwill.

LOBSTER POT: An Air/Sea Rescue float which appeared in one of the London "Wings for Victory" processions. These floats are anchored in the Channel to provide comfort and medical aid for pilots who have been shot down.

Women's Auxiliary Air Force

WOUNDED OR INJURED ON ACTIVE SERVICE.—S/O. O. Turnbull.

DIED ON ACTIVE SERVICE.—A/CW.2 D. D. Norman; A/CW.2 P. Tucker.

Royal Australian Air Force

KILLED IN ACTION.—Sgt. R. M. Taylor.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. A. W. Johnson.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—P/O. H. D. Christian; F/O. I. R. Ingram.

MISSING, BELIEVED KILLED IN ACTION.—Sgt. E. Croal; Flt. Sgt. J. G. Dening; Sgt. F. E. Monckton; Flt. Sgt. J. O'Neil; Act. Flt. Lt. J. C. McI. Rose, D.F.C.; Sgt. W. J. Thompson.

MISSING.—Flt. Sgt. F. A. Couper; P/O. W. D. Fialson; Sgt C. R. Stubbs; Sgt. E. C. Turner.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—F/O. D. A. Dowie.

Royal Canadian Air Force

KILLED IN ACTION.—P/O. G. E. Glenwright; Flt. Lt. H. E. Mitchell; F/O. J. F. Paterson; Sgt. J. G. Trebell.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—P/O. E. J. James.

WOUNDED OR INJURED IN ACTION.—Sgt. M. G. Williams

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—Flt. Sgt. L. J. O. Nadeau.

MISSING, BELIEVED KILLED IN ACTION.—Flt. Sgt. H. T. Boyes; Sgt. J. E. Cloutier; Sgt. F. E. King; Sgt. W. McB. J. Stark; F/O. J. A. W. Withers.

MISSING.—P/O. J. W. Beck; Flt. Sgt. R. G. Clarkson; Act. Flt. Lt. W. S. Crawford; Act. Flt. Lt. S. J. Cybulski, D.F.C.; Sgt. J. F. Edwards; F/O. E. R. Gray; Sgt. W. Harvey; Sgt. S. Jeffries; Sgt. E. G. Jones; P/O. J. Kakvor; F/O. J. W. Loree; Sgt. H. L. McBeath; F/O. R. N. McCleery; P/O. L. R. Mann; Sgt. A. F. G. Martin; Sgt. A. R. O'Dell; Sgt. A. G. Paterson; Sgt. K. N. Read; F/O. J. P. Sullivan; Sgt. J. Takvor; Flt. Sgt. H. E. Wilson.

KILLED ON ACTIVE SERVICE.—Sgt. J. T. McDonald; Sgt. W. E. Woodington.

Royal New Zealand Air Force

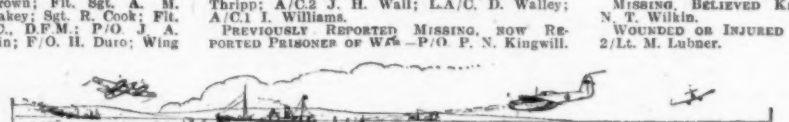
KILLED IN ACTION.—P/O. J. J. Fox.

MISSING, BELIEVED KILLED IN ACTION.—Sgt. C. D. Lamont.

MISSING.—P/O. A. E. Coates; Sgt. A. B. Coburn; Sgt. R. T. Cottrell; P/O. I. W. Downer; F/O. C. D. Fergusson; Flt. Sgt. E. F. McKenna.

KILLED ON ACTIVE SERVICE.—Sgt. W. McB. Sage.

South African Air Force

MISSING, BELIEVED KILLED IN ACTION.—Lt. N. T. Wilkin.

WOUNDED OR INJURED ON ACTIVE SERVICE.—2/Lt. M. Lubner.